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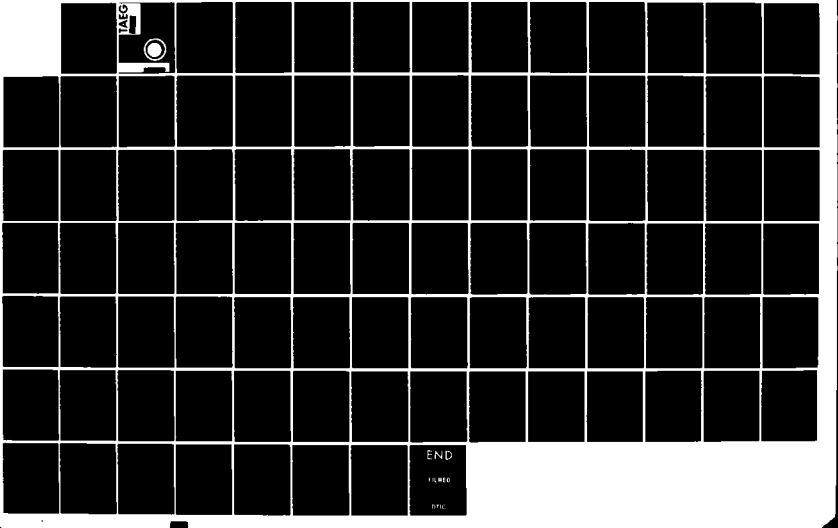

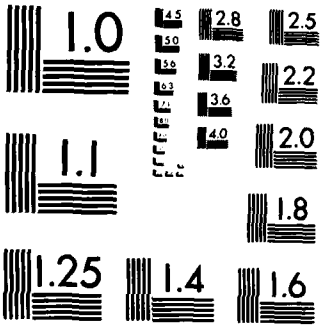

TAEG

TRAINING ANALYSIS AND EVALUATION GROUP

TECHNICAL REPORT NO. 82

A REVIEW OF FIRE FIGHTING TRAINING IN THE NAVAL EDUCATION AND TRAINING COMMAND

FEBRUARY 1980

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TRAINING ANALYSIS AND EVALUATION GROUP
ORLANDO, FLORIDA 32813

TAEG Report No. 82

A REVIEW OF FIRE FIGHTING TRAINING IN THE NAVAL EDUCATION AND TRAINING COMMAND

Curtis C. Cordell
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February 1980

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This report presents the results of a review of the Naval Education and Training Command fire fighting training. The three areas emphasized are management of training, shortfalls in required training, and improper or inefficient training.

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SECTION I

INTRODUCTION

Fire can be one of the greatest detriments to operational readiness; in minutes it can incapacitate people and render machinery inoperative. The Navy Safety Center in its Fire Category Analysis of Surface Ships for January 1973 through December 1978 reported a total of 859 fires. These fires induced 119 injuries and 9 fatalities. The operational forces lost 1,193 operating days as a result. Cost to the Navy was over $37 million. Surface ships during the period January 1973 through December 1978 reported a total of 399 class A, 185 class B, 273 class C, and 2 class D fires. Of these fires, 45 percent occurred in engineering spaces, 14 percent in supply spaces, 10 percent in habitability spaces, 9 percent in aviation spaces, and 2 percent in weapons spaces. To counter this threat a series of fire fighting schools and damage control courses have been established to train Naval personnel in the elements of fire prevention and extinguishment.

Recently there has been an increase in the number of fires aboard ship. This, coupled with an unusually high fire fighting equipment failure rate as reported by the Fire Fighting Assistance Team, has led the Chief of Naval Education and Training (CNET) to conclude that an analysis of all fire fighting training was in order. The Training Analysis and Evaluation Group (TAEG) was tasked by CNET[1] to conduct an in-depth analysis of all fire fighting training that presently exists in the Naval Education and Training Command (NAVEDTRACOM). The initial guidance provided was to conduct an unrestricted investigation and to report the findings with "no holds barred."

The study is organized in two phases. Phase I, the results of which are presented in this report, is concerned with the identification and organization of problems which exist in current fire fighting training. Phase II, which will be initiated at CNET direction, will propose a plan to correct the identified problems in current fire fighting training.

PURPOSE OF THE STUDY

A study of fire fighting training was undertaken to identify major current and anticipated problems in three primary areas--management of training, shortfalls in required training, and improper or inefficient training. The resulting data were organized to determine the extent to which fire fighting training is achieving its goals, the need for additional training requirements, and management considerations for improving training.

[1] CNET ltr Code N-531 of 27 March 1979

CONSTRAINTS

To insure the study program emphasized those areas wherein the greatest potential shipboard fire fighting problems lie, the following constraints have been identified.

- The training aspects of fire fighting, both operation and maintenance, will be emphasized. In order to isolate maintenance factors which require training, it will be necessary to sample fleet inspections to determine the operational readiness of fire fighting equipments and systems aboard ships. Conclusions drawn from these fleet inspections are constrained to the need for the NAVEDTRACOM to react. They are not to be construed as a statement of fleet operational capability.

- Required fire fighting training as identified in Chief of Naval Operations (CNO) and fleet and type commander directives will be identified. These requirements will be considered total fleet requirements.

- Aircraft fire fighting training for ashore-based personnel will not be considered.

- Investigative efforts will be concentrated at the fire fighting and damage control schools. Damage control training, other than that which impinges directly on fire fighting, will not be examined.

- All personnel for whom CNET has a fire fighting training responsibility will be considered. This includes Naval personnel, both active and reserve, U.S. Coast Guard personnel, midshipmen, and other personnel.

- Only equipment maintenance training for fire fighting equipment will be examined; other damage control equipment is excluded.

APPROACH

This study was performed from the perspective of the NAVEDTRACOM, and the problems identified were those which affect that command. There may be valid reasons for the actions of other commands in their interaction with the NAVEDTRACOM and which appear to be in conflict with good training practices; however, these reasons were not investigated as they do not relate to the purpose of this study.

The written requirements of CNO, fleet commanders-in-chief, type commanders, the Chief of Naval Reserve, and other authorities who influence fire fighting training were solicited. The fire fighting schools and Damage Control Training Centers were visited for four purposes:

- to determine their training capability in terms of students processed per course

- to solicit the opinions of school instructors relative to the applicability of training (The instructors at these schools are all senior enlisted persons experienced in fire fighting and have extensive shipboard experience.)

- to establish, where possible and applicable, operational training shortfalls

- to acquire training utilization rates.

Reports of the results of Sub-Board of Inspection and Survey inspections covering damage control were reviewed to determine the probable condition of fire fighting equipment aboard ships. Navy Safety Center personnel were interviewed, and reports covering shipboard fires were obtained and examined. These reports were converted to quantitative, numerical rating scales for installed and portable fire fighting equipment aboard ships. These scales were used to determine which equipments and systems were operationally satisfactory. Those equipments and systems which were not satisfactory identified areas wherein additional maintenance training may be required.

FIRE FIGHTING TRAINING TYPES. Operational fire fighting training, for practical purposes, can be grouped into three types. The first is recruit training which is restricted to the basic chemistry of a fire, classroom instruction, demonstrations, and finally the extinguishment of a simple class B fire. The second is that which prepares a sailor for duty aboard ship. This can be either surface or subsurface and includes sufficient aircraft fire fighting training that the sailor can combat an aircraft type fire aboard ship. The third type of training is that given to aircraft personnel ashore. This training is an expansion of the aircraft fire fighting training given to seagoing personnel and includes situations and equipments not normally found aboard ship, or found in only a limited number of ships. The available courses of instruction for the first two types of fire fighting training are discussed below.

AVAILABLE COURSES. There are a total of 12 individual courses which can be identified in whole or in part with shipboard fire fighting training. These courses are taught at various locations in the continental United States and at overseas bases. For purposes of this study, only schools in the contiguous 48 states were contacted. A listing of the schools and courses taught at each school are tabulated in table 1.

Six of the courses are designed to bring the student directly in contact with fire and are considered to be operational fire fighting training. These are:

- J-495-0412, General Shipboard Fire Fighting Training. This is a basic 2-day course designed to familiarize trainees with the chemistry of fire, the fire fighting tools, and to reduce the psychological fear fire generates by placing him/her in a fire situation.

TABLE FIRE FIGHTING AND DAMAGE CONTROL SCHOOLS AND COURSES TAUGHT

COURSE	LOCATION							
	NDCTC PHILA	FTC NORVA	FTC CHARLES	FTC MAYPORT	RTC ORLANDO	RTC GLAKES	NTTC T.I.	FTC SDIEGO
J-495-0412	Yes	Yes	Yes	Yes	No	No	Yes	Yes
J-495-0413	No	Yes	No	Yes	No	No	No	Yes
J-495-0414	No	Yes	Yes	Yes	No	No	Yes	Yes
J-495-0418	Yes	Yes	Yes	Yes	No	No	Yes	Yes
J-495-2129	No	No	No	No	Yes	Yes	Yes (CG only)	Yes
J-495-0426	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
J-495-0050	No	Yes	No	No	No	No	No	Yes
J-495-0423	No	No	Yes	No	No	No	No	No
X-888-8881	No	Yes	No	No	No	No	No	No
A-495-2037	Yes	Yes	Yes	Yes	No	No	Yes	Yes
J-495-0400	No	Yes	Yes	Yes	No	No	Yes	Yes
HT "A"	Yes	No	No	No	No	No	Yes	No

TABLE 5. SHIP FIRE FIGHTING OPERATIONAL READINESS SURVEY RESULTS (continued)

Ship Designation*	Number Fire Fighting Systems**	Deficient Systems**			Operational Readiness Factor (ORF)
		Total Number	Percent Major	Percent Minor	
LPH-46	21	15	67	33	.686
LPH-47	21	11	36	64	.845
LSD-48	20	13	69	31	.694
LSD-49	20	12	33	67	.843
LST-50	21	14	57	43	.732
LST-51	21	18	67	33	.630
LST-52	21	15	33	67	.805
LST-53	21	12	25	75	.867
MSO-54	17	4	75	25	.890
MSO-55	17	8	50	50	.841

*Ship class designation identifies the different classes of ships included in the analysis; numerical designations are in sequential order and do not identify actual vessels.

**System refers to the number of different types of fire fighting systems/equipments as identified from the Sub-Board of Inspection and Survey reports.

TABLE 5. SHIP FIRE FIGHTING OPERATIONAL READINESS SURVEY RESULTS (continued)

Ship Designation*	Number Fire Fighting Systems**	Deficient Systems**			Operational Readiness Factor (ORF)
		Total Number	Percent Major	Percent Minor	
CG-24	20	12	42	58	.813
CG-25	20	12	17	83	.889
CGN-26	20	13	54	46	.755
CGN-27	20	5	0	100	.975
DD-28	20	14	36	64	.809
DD-29	20	10	50	50	.813
DD-30	20	15	27	73	.823
DD-31	20	12	25	75	.867
DD-32	20	9	33	67	.884
DDG-33	20	12	25	75	.859
DDG-34	20	10	40	60	.848
DDG-35	20	12	25	75	.870
DDG-36	20	11	36	64	.839
DDG-37	20	10	10	90	.924
FF-38	20	12	33	67	.843
FF-39	20	12	25	75	.861
FF-40	20	12	50	50	.792
FFG-41	20	11	36	64	.845
LPD-42	21	17	47	53	.728
LPD-43	21	13	31	69	.845
LPD-44	21	11	27	73	.867
LPH-45	21	12	58	42	.774

TABLE 5. SHIP FIRE FIGHTING OPERATIONAL READINESS SURVEY RESULTS

Ship Designation*	Number Fire Fighting Systems**	Deficient Systems**			Operational Readiness Factor (ORF)
		Total Number	Percent Major	Percent Minor	
AD-1	19	11	55	45	.783
AD-2	19	8	50	50	.847
AE-3	19	10	60	40	.780
AE-4	19	11	64	36	.767
AE-5	19	11	73	27	.722
AFS-6	19	13	46	54	.769
AO-7	20	15	33	67	.786
AO-8	20	13	38	62	.802
AOE-9	20	14	43	57	.775
AOE-10	20	12	42	58	.809
AOR-11	20	10	40	60	.841
AOR-12	20	15	40	60	.791
AR-13	19	8	50	50	.850
ARS-14	19	11	55	45	.785
ARS-15	19	7	43	57	.880
ARS-16	19	11	64	36	.762
ARS-17	19	14	43	57	.775
ARS-18	19	10	30	70	.874
ARS-19	19	9	33	67	.873
AS-20	20	11	27	73	.866
AS-21	20	11	45	55	.809
AS-22	20	14	36	64	.790
CG-23	20	13	15	85	.888

SHIPS REQUIRING TRAINING. The second half of the maintenance training requirement is who needs this training. Since the responsibility for the PMS of fire fighting equipment is spread over many ratings and all divisions of a ship, it was adjudged more efficient to determine which ships require the training rather than which rating. With this information available, commanding officers can request needed quotas from appropriate authority. The maintenance condition scores for all systems and equipment classifications installed on each ship were used to establish a fire fighting readiness capability score for the ship. This score was defined as the Operational Readiness Factor (ORF) for that ship. A listing of the ORF for each ship for which there was a Sub-Board of Inspection and Survey report is given in table 5. The procedure used to calculate the ORF score is described in detail in appendix A. Of the 55 ship reports analyzed, it is noteworthy that only one was outstanding, one was good, and 15 acceptable. All others were either marginal or unsafe. A conversion of the numerical ORF score to a rating is identical to the conversion of the ER and is shown in table 4. Thus, a commander has an indication of the fire fighting equipment readiness for any ship under his command and can determine the training needs for that ship. For the NAVEDTRACOM, these scores can be used as an indicator of required maintenance training for the short-run period.

TABLE 3. SYSTEM/EQUIPMENT EFFECTIVENESS RATIOS

	System/Equipment	Sample Size*	Criticality Classifications (%)			Effectiveness Ratio (ER)
			Major	Minor	None	
1.	Compartment Checkoff/ D/C Plates	55	0	69.1	30.9	.957
2.	Portable Blowers	55	3.6	23.6	72.7	.953
3.	Firepumps	55	7.3	7.3	85.5	.952
4.	CO_2 Portable Systems	55	1.8	45.6	52.7	.944
5.	PKP Portable Systems	55	7.3	36.4	56.4	.929
6.	Flash Screens	55	16.4	7.3	76.4	.900
7.	Magazine Sprinkler System	55	7.3	45.5	47.3	.888
8.	OBA(s)	55	7.3	78.2	14.5	.879
9.	OBA Training Kits	55	21.8	7.3	70.9	.868
10.	Fog Foam System	40	20.0	15.0	65.0	.853
11.	Firemain	55	10.9	76.4	12.7	.852
12.	Submersible Pump(s)	53	22.6	22.6	54.7	.847
13.	CO_2 Smothering System	55	12.7	74.5	12.7	.833
14.	Water Curtain(s)	10	30.0	30.0	40.0	.798
15.	Audible and Visual Alarms	55	36.4	34.5	29.1	.748
16.	Flame Arrestors	55	40.0	24.0	36.0	.742
17.	Survival Support Devices	55	47.3	20.0	32.7	.704
18.	FP-180 Pump(s)	55	49.1	16.4	34.5	.693
19.	Countermeasures System	53	56.6	22.6	20.8	.634
20.	Twin Agent System	55	49.1	38.2	12.7	.614
21.	P-250 Pump(s)	55	65.5	29.1	5.5	.565

*Sample Size refers to the number of ships surveyed that were known to be equipped with the system/equipment, not the total number of systems/ equipments.

Effectiveness Ratios. Each system and equipment classification aboard each ship was assigned a maintenance condition numerical score which was calculated from the Sub-Board of Inspection and Survey reports. These individual scores were used in computing the overall score for each system and equipment classification and was defined as the effectiveness ratio (ER) for that system or equipment classification. A summary of the ERs is shown in table 3. In addition to the ERs, table 3 gives the percentage of each criticality classification as it applies to the individual systems and equipments. Thus, at a glance, it is possible to estimate the relative seriousness of the deficiencies. The importance of the ER is that it defines the material condition of any given system or equipment over a given period of time. For the ships in question, the INSURV reports covered the period April 1976 to June 1979. Conversion of the computed ER to a rating is incorporated in table 4.

TABLE 4. ER/ORF CONVERSION TO RATING

ER/ORF	Rating
.95 - 1.00	Outstanding
.90 - .949	Good
.85 - .899	Acceptable
.80 - .849	Marginal
.799 or less	Unsafe

It behooves the NAVEDTRACOM to examine each of the systems and equipments with an ER of marginal or unsafe in terms of maintenance training available or courses which require revision. Those systems with a large percentage of criticality classifications entitled Major are prime candidates for maintenance training courses. From table 3 it is apparent that system/equipment numbers 14 through 21 appear to require maintenance training courses. In other words, are we providing adequate and proper training for these systems and equipments?

Having determined that a specific system or equipment requires a maintenance training course, it becomes necessary to isolate the factors which should be included in the curriculum. These factors are determined from the predominant types and causes of deficiencies. A detailed listing of the types of deficiencies is included in appendix A, table A-15, and the cause of the deficiencies, appendix A, table A-17. For existing courses; i.e., course A-495-2037, the curriculum should be reviewed with these factors as the basis for review. New courses should be developed to emphasize the identified factors in those instances where the material is not available in existing courses.

discussed the material condition of fire fighting equipment aboard carriers. Because the Fire Fighting Assistance Team reports discussed only a limited number of systems and equipments, and because the high capacity fog/foam systems are in a state of change, the reports may not reflect the current status aboard ship and were not used in the determination of maintenance training requirements.

Twenty-one classifications of systems and equipments were identified as being of vital importance to fire fighters. All ships were known to include at least 17 of the 21 systems and equipments. For each system or equipment, a deficiency criticality classification of Major, Minor, or None was assigned. Major is defined as any discrepancy or series of discrepancies which produce an unsafe personnel situation or prevent effective fire fighting operations. A system or equipment which was reported as having a major deficiency criticality classification, even though it was corrected prior to the report being prepared, was so scored. A minor deficiency criticality classification is defined as any discrepancy which reduces the effectiveness of the equipment or system, but does not render it ineffective. Systems which had no reported major or minor deficiencies were considered to have no (none) deficiency criticalities.

In addition to the deficiency criticality classification, a total of six types of deficiencies and nine causes of these deficiencies were identified. Four of the six types of deficiencies accounted for approximately 85 percent of the problem areas. These four are: improper or unperformed equipment maintenance, inspection deficiencies which should have been uncovered during scheduled PMS, installation deficiencies, and equipment or system inoperative. Of the nine causes, only four--equipment or parts missing, not calibrated or out of tolerance, frozen or clogged equipment, and equipment improperly stowed--accounted for over 78 percent of the causes. Appendix A contains a detailed listing of the types of deficiencies and causes, raw data extracted from the INSURV reports, a scoring system developed to identify which equipments and systems required training emphasis, areas of weakness, and which ships were in need of additional training. A summary of these data is contained in the following section.

Data Summary. A numerical scoring system was developed for the purpose of converting comments contained in the Sub-Board of Inspection and Survey reports to quantitative expressions which could be used for statistical analysis. This scoring system was used to determine:

- the overall maintenance condition of each system/equipment classification
- the overall fire fighting capability of each ship with respect to the material condition of the total of the fire fighting systems/equipments installed.

TABLE 2. PERSONNEL FIRE FIGHTING TRAINING REQUIREMENTS, 1979, OTHER THAN FLEET REQUIREMENTS

Command	Course	Quotas	Location
USNA	J-495-0412	1,080	Philadelphia
USCG Mid'n	J-495-0412	219	Philadelphia
USCG	J-495-0412	2,850	Various
USNR	J-495-0412/0426	324	Charleston
USNR	J-495-0412/0426	135	Mayport
USNR	J-495-0412/0426	65	Norfolk
USNR	J-495-0412/0426	420	Philadelphia
USNR	J-495-0412/0426	75	San Diego
USNR	J-495-0412/0426	600	Treasure Island
USCG	J-495-0413	34	Various
USCG	J-495-0418	38	Various
USCG	A-495-2037	180	Various

MAINTENANCE TRAINING REQUIREMENTS

The preceding summarized the various personnel training requirements levied on CNET. The directives reviewed said little about maintenance training requirements for fire fighting equipment and provided no direction with respect to PMS or inspection procedure training requirements. The maintenance training requirements were derived from analyses of the Sub-Boards of Inspection and Survey reports. The analyses produced two classes of data: which fire fighting equipments and systems required more attention from a training viewpoint, and what ships should presumably increase attendance at maintenance training courses. The following paragraphs describe these requirments. Details of the analyses are provided in appendix A.

EQUIPMENTS/SYSTEMS REQUIRING TRAINING. Senior Member, Sub-Boards of Inspection and Survey (INSURV), Atlantic and Pacific, was requested to forward copies of representative reports covering the Hull/Damage Control inspections of various units. Twenty were received from the Atlantic Fleet and 35 were received from the Pacific Fleet. These reports covered the following classes of ships: AD, AE, AFS, AO, AOE, AOR, AR, ARS, AS, CG, CGN, DD, DDG, FF, FFG, LPD, LPH, LSD, LST, and MSO. In addition, the Chief of Naval Material was requested to forward reports of the Fire Fighting Assistance Team which

- Course J-495-0418 will be used for the training of designated teams only, and officers-in-charge and team leaders must attend with their team. In addition, course J-495-0412 is a prerequisite for each member of the team attending course J-495-0418.

The governing directive for Commander Naval Air Force (COMNAVAIRLANT), U.S. Atlantic Fleet, is COMNAVAIRLANT Instruction C3500.24D. This directive requires that, when feasible, personnel assigned to repair/fire parties perform as a team in live fire fighting training. Specific personnel and courses are not identified.

The submarine force trains under COMSUBLANT Instruction 1500.32. Fire fighting personnel training goals are established for surface ships in courses J-495-0412, -0418, and various damage control courses which include fire fighting equipment maintenance. Only course A-495-2037 has a required quota of 14 graduates per year.

PACIFIC FLEET REQUIREMENTS. Commander Naval Surface Force (COMNAVSURFPAC), U.S. Pacific Fleet, has issued COMSURFPAC Notice 3500 which specifies the minimum number of school graduates for each ship type and command. All engineers, repair party personnel, in-port fire parties, gunner's mates, torpedomen, ammunition and explosive handlers, and various personnel from amphibious support units must attend J-495-0412 within 6 months of reporting aboard. Course J-495-0413 must be attended by LHA, LPD, and LPA personnel routinely assigned duties on flight and hangar decks, the Damage Control Assistant (DCA), air officer, flight deck officer, and fuels officer within 6 months of reporting aboard. The same personnel from any ship having a helicopter capability are required to attend course J-495-0414. Two men from each major ship and one from each small ship plus various persons from beach parties and amphibious support units are required to attend A-495-2037. It is worthy of note that the Shipboard Fire Fighting Team Training course, J-495-0418, is not referenced in this instruction.

Commander Naval Air Force, U.S. Pacific Fleet (COMNAVAIRPAC), has developed a matrix of training requirements in COMNAVAIRPAC Instruction C3500.4E. The basic course, J-495-0412, is required of all members of the ship's company except flight and hangar deck personnel. All air wing DCPOs must also attend this course. The refresher cycle is 1, 2, or 3 years. In addition, ship's company, except DCPOs, engineering personnel, and the in-port fire party and repair party (excluding OBA men and scene leaders) must attend J-495-0413. All air wing personnel must attend J-495-0413. Ship's company whose duty assignment includes fire fighting teams, in-port fire parties, OBA men, scene leaders, repair party teams, and all hull technicians must attend J-495-0418 with a 1-year refresher cycle.

OTHER REQUIREMENTS. In addition to the numbers and types of persons required to attend various fire fighting courses generated by the fleet and type commanders, quotas have been requested of and granted by CNET for various other categories of personnel. Fleet requirements cannot, at this time, be translated with any degree of accuracy into specific numbers. The other 1979 quotas for training requirements are specific as can be seen in table 2. These requirements for quotas were obtained from various letter requests to CNET.

Prospective commanding and executive officers, engineering officers, and air officers are required to have refresher training prior to the assumption of their duties.

ATLANTIC FLEET REQUIREMENTS. CINCLANTFLT Instruction 3541.1B, subj: Training Requirements, is the controlling requirement document for the Atlantic Fleet. It restates the CNO training requirements with modifications applicable to the Atlantic Fleet units. Only modifications and additions to the CNO requirements are enumerated below.

- All personnel are required to receive live fire fighting training within the prior 4 years. This reduces the refresher training cycle by 2 years from the CNO time frame.
- Sixty percent of all repair party personnel, fire fighting squads, and personnel assigned to in-port damage control parties shall have completed course J-495-0418 during the current tour of duty. All other personnel assigned these duties are required to have attended course J-495-0412.
- All personnel on carriers, LHAs, LPHs, and LPDs whose general quarters or flight operations station is in the vicinity of the flight or hangar deck must have attended course J-495-0413 within the past 2 years.
- On nonaviation ships, every member of the helicopter fire fighting team and all personnel whose flight operation station places them near the helicopter deck must have attended course J-495-0414 within the prior 2 years. However, in unusual instances, course J-495-0413 may be substituted.
- Every other person aboard ship must have attended either course J-495-0412, J-495-0413, or J-495-0418.

For the ships under the command of Commander Naval Surface Force, U.S. Atlantic Fleet (COMNAVSURFLANT), the controlling document is COMSURFLANT Instruction C3500.2. The variations from senior command directives are:

- Refresher training using course J-495-0412 is required each 6 years.
- On aviation capable ships all flight deck repair party and fire fighting team personnel are required to attend course J-495-0413 each 12 to 14 months and within 60 days prior to departure on operational missions.
- On aviation capable ships all flight deck repair party and all scene/team or party leaders are required to attend course J-495-0414 each 12 to 14 months and within 60 days of deployment.
- Aircraft handlers and aircraft fueling crews are required to attend courses J-495-0413 or J-495-0414 each 12 to 14 months.

SECTION II

TRAINING REQUIREMENTS

This section summarizes the fire fighting training requirements derived from existing CNO, fleet, and type commander directives and letter requests submitted to CNET by other agencies, as well as from inspection reports and interviews with persons familiar with fire fighting conditions. Two classes of training requirements were identified: personnel training requirements and maintenance training requirements.

Personnel training requirements, in terms of numbers, where possible, and types of training were identified from an analysis of obtainable fleet directives and letter requests from various agencies to CNET for school quotas.

Maintenance training requirements, in terms of the personnel who require training and levels of training desired, were not specified in existing directives. Therefore, an analysis was made of Sub-Boards of Inspection and Survey, Atlantic and Pacific, reports of ship damage control inspections to identify what training may be required.

PERSONNEL TRAINING REQUIREMENTS

CNO REQUIREMENTS. CNO has stipulated (OPNAVINST 3541.1B) that all officers and enlisted persons, prior to their first assignment afloat, and all officers and enlisted attached to embarked units, will receive fire fighting training covering the following areas:

- instruction in class A, B, C, and D fires with live fire fighting experience in one or more classes of fire
- instruction in the operation of foam proportioners and portable pumps
- demonstrate a capability on hoses, nozzles, applicators, portable extinguishers, OBA, safety lines, signals, and resuscitation.

Despite the fact that all areas of fire fighting training specified are not covered during recruit fire fighting training, and provided live fires have been fought during recruit training, this is considered adequate if graduation occurred within 1 year of reporting aboard ship. Refresher training is required every 6 years for officers and on reenlistment or extending a tour of obligated service for enlisted.

Advanced fire fighting training, both theoretical and practical, is required of all engineering personnel, flight and hangar deck personnel, personnel assigned fire fighting duties, and others who routinely handle flammables and explosives. Additionally, all hull technicians, E-6 and above, and all repair party, unit, or in-port emergency team leaders will be qualified as instructors. Refresher training is required of these people every 6 years.

- J-495-0400, Division Damage Control Petty Officer (DCPO) Indoctrination. This is a 1-day indoctrination course which covers the general duties of the DCPO. Since the PMS of fire stations and divisional day-to-day fire prevention inspections are a portion of the DCPO responsibility, this course was developed to acquaint him with the nature of these duties.

- HT "A" School. This is an extended school for firemen who are entering the hull technician (HT) rating. This school is the primary source of information on the maintenance and operation of fire fighting systems.

ORGANIZATION OF THE REPORT

In addition to this introduction, four major sections are presented. Section II summarizes the current training requirements. Operational requirements were derived from existing directives, inspections, and interviews. Prospective maintenance training requirements were identified from an analysis of Sub-Boards of Inspection and Survey reports.

Section III presents the findings of the survey conducted at each of the eight continental United States schools which teach fire fighting.

Section IV discusses the management and environmental influences on training. The management influences are derived from subjective opinions solicited from the various school personnel. Environmental influences discuss the effects of the facilities, outside regulatory bodies, funding, and equipment problems on training.

Section V contains the conclusions and recommendations.

In support of the major sections two appendices are included. Appendix A details the procedures used in the fire fighting equipment maintenance training deficiency analysis and presents the detailed findings. Appendix B presents the attendance, utilization rates, and no-show rates at all schools for each of the fire fighting related courses for the 6-month period 1 January to 1 July 1979.

- J-495-0413, Shipboard Aircraft Fire Fighting Training. Course 0413 is a basic 2-day general aviation fire fighting course designed to familiarize flight and hangar deck personnel with a typical oil spill fire. Included are the techniques of pilot rescue. There are no prerequisites to this course.

- J-495-0414, Aviation Facility Ship Helicopter Fire Fighting Team Training. This is a 1-day follow-on course to J-495-0413. It presumes a knowledge of the tools and techniques employed in aircraft fire fighting. A pre-formed hangar or flight deck fire team from a single operating unit is trained in the specialized techniques used in helicopter fire fighting and pilot rescue. No prerequisites are stated as required of students attending this course.

- J-495-0418, Shipboard Fire Fighting Team Training. The essential purpose of this course is to sharpen the skills of an existing fire fighting team and to insure that each member of that team contributes according to his specific duty assignment. It is a 1-day course structured for a complete emergency shipboard team--each member being a graduate of the J-495-0412 course.

- J-495-0426, Reserve Aircraft Fire Fighting. The title of this course is a misnomer. It is actually a combination of the basic J-495-0412 and J-495-0413 courses given to Naval reserve personnel on weekends. It is given as a 1- or 2-day course, depending on which facility presents the course and the time available.

- J-495-2129, Fire Fighting - Recruit Training. This is an indoctrination course given to recruits during recruit training.

The remaining six courses are peripheral to fire fighting but contain essential elements associated with maintenance and the preparation and use of equipment. The association with fire fighting, as contrasted to damage control in general, is discussed after each course.

- J-495-0050, Foam Generating Systems. This 7-day course covers the Twin Agent Unit (TAU) and the various configurations of installed high capacity fog and foam systems. It is an operator and maintenance course which emphasizes the Planned Maintenance System (PMS).

- A-495-2037, Damage Control P-250 Portable Emergency Pump Operation and Maintenance. The purpose of this 3-day course is to teach the operation, particularly the adjustments, and maintenance of the P-250. Planned Maintenance System procedures and repair are emphasized.

- J-495-0423, Oxygen Breathing Apparatus (OBA) Requalification. A half-day course to insure that personnel know how to use the OBA.

- X-888-8881, Identical to J-495-0423.

SECTION III

SCHOOL SURVEY FINDINGS

As indicated previously, existing fire fighting training requirements originate from CNO and are stated in OPNAVINST 3541.1B, Damage Control Training Requirements. Each fleet commander-in-chief and type commander amplifies this instruction to suit the requirements of the command and class of vessel.

With the exception of midshipman, Naval Reserve, and U.S. Coast Guard, requirements for training are not stated in numbers. Rather, they are stated in terms of billet assignment or rating and the periodicity of training. CNO requirements for training are stated in broad terms which identify minimum knowledge and skill exposures. Operational training requirements, as enumerated by fleet or type commanders are stated in terms of specific courses which personnel should or must attend. This compromises the ability of CNET and his functional commanders to establish exact, or even reasonable estimates of the numbers who require training.

COURSE UTILIZATION

The numbers of attendees at each school and at each course were obtained from the school and/or quota control for the period January through June 1979. The figures were available and constituted a sufficient sample to be statistically reliable. One exception to this procedure was Great Lakes. Their fire field is closed from 1 November through 1 April each year because of weather. The Great Lakes figures were computed on the basis of 7 months per year utilization. Since the U.S. Navy Damage Control and Fire Fighting Schools train Naval reservists, U.S. Coast Guard, U.S. Marines, and various nonmilitary groups, a breakdown of the categories of personnel trained was made where such figures were available. In this way it was possible to estimate the fleet utilization rate as well as the overall utilization rate.

The six courses which involve actual fire fighting training are best described as operational in that trainees learn to use fire fighting extinguishment and support equipment and the techniques of employment. Each of these courses will be discussed independently.

Two important ratios are computed for each operational course. These are the utilization rate and the no-show rate. The utilization rate for each individual operational course is computed by dividing the total number of quotas available, regardless of whether or not they were requested, by the total number of attendees. Quotas available were determined by multiplying the number of courses available during the 6-month period, downtime excluded, by the maximum number of quotas available to be issued for that course. The two team training courses, J-495-0414 and J-495-0418, utilized team quotas, not individuals. The no-show rate is computed by dividing the number of quotas requested less the actual quotas filled by the quotas requested. The difference between utilization rate and no-show rate is that the utilization rates are computed on the quotas available, and no-shows are computed on the basis of quotas requested. A certain degree of estimation was required because of data format differences. For example, in some instances in the team training courses the numbers trained were recorded as individuals. This required a conversion to the number of

teams. In all such cases, minimum team size was used to give the schools all possible benefit.

COURSE J-495-0412. This course has the greatest demand of all offered. There were 16,854 total attendees at the six facilities which present this course during the period investigated. During this same period, there were 22,242 quotas available which means that the overall utilization rate was 75.8 percent. Downtime was excluded in calculating the utilization rate; the stated rate is for the operational time available. Table 6 is a summary of attendance figures by school; a detailed breakdown of attendees by category and school is contained in appendix B.

TABLE 6. SUMMARY OF ATTENDANCE AT COURSE J-495-0412 BY SCHOOL

	NDCTC PHILA	FTC NORVA	FTC CHARLES	FTC MAYPORT	RTC ORLANDO	RTC GLAKES	NTTC T.I.	FTC SDIEGO
Quotas Available	2,880	7,296	690	1,800	NA	NA	3,960	5,616
Quotas Used	1,906	4,796	533	1,464	NA	NA	2,297	4,701
No-Shows	34	34	13	UNK*	NA	NA	15	27

*Percent no-shows based on quotas requested. Not available at Mayport.

With the exception of the San Diego facility, quota assignment is accomplished at the parent command, not by the school. Commander Training Command, U.S. Pacific Fleet (COMTRAPAC) acts in the capacity of quota control for the Fire Fighting School, San Diego. It is notable that quotas must be requested as much as 180 days in advance of the course convening date at three schools and over 90 days in advance at another. This time lag between the issuance and using of quotas causes many units to cancel or simply not send personnel. The problem is partially alleviated at the Fire Fighting School, San Diego. Standby students are accepted at the school without prior quota assignment to fill vacant spaces as they become available. Fifteen percent of the trainees in course J-495-0412 were in this category, and this raised the course utilization rate from 73 percent to 85 percent. Standby students are reported to quota control after the fact. A similar procedure should be considered at the remaining schools if the high percentage of no-shows (13 percent to 34 percent) continues.

Utilization rates include all personnel trained who are reported to quota control. In terms of U.S. Navy operational personnel, the utilization rates require a downward revision because of the number of nonfleet type people trained. Five of the six schools maintained records of the Naval reserve, U.S. Coast Guard, and foreign and nonmilitary people trained. In these schools, only 86.1 percent of the actual trainees were fleet operational personnel. Thus, the overall utilization rate for U.S. Navy operational personnel is 64 percent.

The Fire Fighting School, NTTC, Treasure Island, expends a large effort training other than U.S. Navy personnel and does not report this training. During the investigated period, 1,157 U.S. Coast Guard and civilians were trained which is approximately 50 percent of the reported numbers trained.

COURSE J-495-0413. This course is designed for persons assigned to aviation capable ships and should be in great demand for those whose work or battle station is on a hangar or flight deck. Only three schools offer the course. During the 6-month period for which statistics were gathered, 6,462 students of a possible 8,100 attended for an overall utilization rate of 79.8 percent. Table 7 is a summary of attendance figures by school; details are contained in appendix B.

TABLE 7. SUMMARY OF ATTENDANCE AT COURSE J-495-0413 BY SCHOOL

	NDCTC PHILA	FTC NORVA	FTC CHARLES	FTC MAYPORT	RTC ORLANDO	RTC GLAKES	NTTC T.I.	FTC SDIEGO
Quotas Available	NA	3,000	NA	1,500	NA	NA	NA	3,600
Quotas Used	NA	2,013	NA	1,256	NA	NA	NA	3,193
% No-Shows	NA	33	NA	Unk*	NA	NA	NA	23

*Percent no-shows based on quotas requested. Not available at Mayport.

The quota assignment and control problem is identical to the J-495-0412 course. This is reflected in a no-show rate of between 23 percent and 33 percent.

Again the utilization rate must be downgraded by deducting the numbers of non-U.S. Navy persons trained. In the case of course J-495-0413 for the schools in which these trainees were identified, only 83.9 percent of the trainees were fleet operational personnel which reduces the overall utilization rate for U.S. Navy operational personnel to 67 percent.

One school conducts this course, or a modified version thereof, on an ad hoc basis when requested by fleet units. This is unreported training for which no records are maintained and is, therefore, not included in the computations.

COURSE J-495-0414. This course is a team course required for personnel who work in the vicinity of helicopters. Since most combatants as well as aviation, amphibious craft, and service ships depend on vertical replenishment, utilization should be high. Utilization calculations are based on the team, which varies in size from 14 to 30 men per team, rather than individuals. Of a total of 247 team quotas offered, only 170 were used giving a utilization rate of 68.8 percent. Table 8 summarizes attendance at each of the schools at which this course was presented. Details are contained in appendix B of this report.

TABLE 8. SUMMARY OF TEAM ATTENDANCE AT COURSE J-495-0414 BY SCHOOL

	NDCTC PHILA	FTC NORVA	FTC CHARLES	FTC MAYPORT	RTC ORLANDO	RTC GLAKES	NTTC T.I.	FTC SDIEGO
Quotas Available	NA	72	23	25	NA	NA	52	75
Quotas Used	NA	38	12	17	NA	NA	47	56
% No-Shows	NA	47	14	UNK*	NA	NA	16	18

*Percent no-shows based on quotas requested. Not available at Mayport.

Quota control presents the identical difficulties encountered in course J-495-0412. The no-show rate varies between 14 percent and 47 percent, which is significant in terms of instructor utilization and the number of teams trained for the fleet.

Utilization is predominately by U.S. Naval operational units. The numbers of other users of this course are not significant although at the NTTC, Treasure Island, a small number of reported training classes are conducted for non-military teams.

COURSE J-495-0418. This is the only team training course for ship emergency fire fighting teams. As such it should be heavily used by all fleet units. Calculations are based on teams rather than individuals. A team will vary in size, depending on the type of team and the size of the ship, from 12 to 30 men. Of a maximum of 319 team quotas available, 207 were filled for an overall utilization of 64.9 percent. Table 9 is a summary of course utilization by school; details are contained in appendix B.

TABLE 9. SUMMARY OF TEAM ATTENDANCE AT COURSE J-495-0418 BY SCHOOL

	NDCTC PHILA	FTC NORVA	FTC CHARLES	FTC MAYPORT	RTC ORLANDO	RTC GLAKES	NTTC T.I.	FTC SDIEGO
Quotas Available	UNK	96	46	50	NA	NA	52	75
Quotas Used	UNK	69	29	41	NA	NA	25	43
% No-Shows	UNK	28	12	UNK*	NA	NA	34	48

*Percent no-shows based on quotas requested. Not available at Mayport.

The problem of quota control is identical to all previously discussed courses. In addition, there are specific prerequisites for this course which are critical for satisfactory completion of the offered training in the allocated time period. These prerequisites are not always met by the teams when it reports to the school for training. Some schools reject these teams, while others give what training is possible under the circumstances. Naval Damage Control Training Center (NDCTC), Philadelphia, will present this course on a request basis, but the capability is not listed in the Catalog of Navy Training Courses (CANTRAC), nor are the attendees reported to quota control or to the Navy Integrated Training Resources and Administrative System (NITRAS).

The reported percentage of non-U.S. Navy operational units making use of this course is not significant. However, Naval reserve units usage appears to be increasing and may become significant in the future.

COURSE J-495-0426. There are incomplete records of the numbers of quotas requested or available at either the schools or at quota control. In addition, one school gives this Naval reserve weekend course as a 1-day course, and another gives it as either a 1- or a 2-day course.

Three of the seven schools offering this course reported records of the numbers of quotas available (786) and the numbers of quotas filled (636) for a utilization rate of 80.9 percent. However, two schools offer quotas only on request, and another offers the course quarterly, but on request only. Three schools do not have a maximum or minimum quota, two schools have no record of the number of attendees, and one school includes these trainees in their records for course J-495-0412. Thus any statistics concerning this course are highly suspect. Even the training records at the Headquarters, Chief of Naval Reserve, are incomplete in that the number of their personnel who have attended a fire fighting course cannot be determined.

Discussions were held with instructors and the quota control personnel at all activities visited. It was the concensus of these people that reserve fire fighting course is poorly attended, and, even when classes are scheduled, the no-show rate is far greater than the computed utilization indicates.

COURSE J-495-2129. This course is fully used by recruits.

USCG RECRUIT FIRE FIGHTING TRAINING COURSE. This is not a listed course; however, NTTC, Treasure Island, conducts a weekly, 1-day fire fighting course for U.S. Coast Guard recruits. No quotas are issued. For the 6 months investigated there were a total of 790 attendees. This training is not reported to NITRAS.

COURSE CONTENT

The Catalog of Navy Training Courses provides a listing of available courses, prerequisites for each course, and course purpose and scope. These are derived from the approved curriculum as developed by the lead school. Current directives require all schools to follow the approved curriculum; hence all courses should be standard. In fire fighting, training policy

dictates that deviation from the approved curriculum is permitted only to accommodate physical differences among the schools. An exception to this policy is permitted when a school revises a given course and then conducts the revised course in a pilot program.

The investigation revealed that the intended standardization occurs in few of the operational fire fighting courses and is nonexistent in the supporting courses. A portion of this can be attributed to facilities, but by and large the deviations are condoned, in fact, encouraged, by the schools. Fire fighting instructors were found to be dedicated, hard working men who have a great deal of shipboard experience in the general area of damage control. The concensus of instructors at each school controls the emphasis placed on each course at that school.

The following paragraphs discuss each of the courses as they were observed with respect to curriculum and required training.

COURSE J-495-0412. A 2-day course is inadequate to teach the required curriculum and meet the requirements of OPNAVINST 3541.1B. A minimum of 4 days is needed although it would be better if the course were 5 days. The extra day would provide additional hands-on time which could be used to reinforce acquired skills. During a 2-day training period, students are not receiving adequate hands-on time, and the classroom portion is too limited. Investigation, inspection, post fire overhaul, submersible pumps, OBA line tending techniques, and demonstrated abilities in all of the required areas are not included.

The course is taught differently at each school. Variations have been introduced to include training in school-perceived critical areas. For example, students do not wear the OBA when actually fighting fires except at NTTC, Treasure Island, and FTC, San Diego.

OBA training is minimal and could better be described as familiarization. No effort is made to place trainees under stress as would be the rule when fighting a fire; therefore, students do not obtain a true, clear picture of the problem associated with working in the OBA. Line tending is not taught, consequently signals are not learned. OBA training is not satisfactory.

Officer and senior enlisted personnel (E-7, E-8, and E-9) do not attend the course in significant numbers. For example, FTC, San Diego estimates that three officers and three senior enlisted attend each class on a yearly average. This means only 324 of each category are trained annually. At the Fleet and Mine Warfare Training Center, Charleston, the estimate is 20 officers and an equal number of senior enlisted per year. When refresher and replacement training requirements are considered, these numbers appear low.

The number of repeats, that is, trainees who return to the school for the basic course within 6 months, is significant at some schools. No records are maintained, but the Charleston instructors estimate the number runs as high as 40 percent and the San Diego instructors estimate 10 percent. Of equal concern were the number of personnel sent who had less than 3 months obligated service and the obvious misfits. Again, no records of the attendees in these categories were maintained, but all schools reported a significant number were ordered to the school.

[illegible] attendance at course J-495-0412 of repeaters, short timers, and [illegible] men could be a result of the times; that is, level or expanded [illegible] tional commitments, a reduced manning level, and a less highly [illegible] average man. These possible influences were not examined since they [illegible] the scope of this study.

The concensus of fire fighting instructors is that student attitude [illegible] poor and there is very little motivation. This stems from the approach taken toward fire fighting training aboard operating units. It has a low priority with respect to ship's work; therefore, the least effective sailors are sent to the school. One exception to this situation is NTTC, Treasure Island. Here student attitude is good and motivation is high. Two factors appear to contribute to this condition. First, the student population came from a distance; therefore, the importance of fire fighting was recognized. Second, the school incorporated competition on the field and introduced casualties during drills thereby stimulating student interest.

COURSE J-495-0413. This course is taught at two schools on the east coast and one on the west coast. It is considered satisfactory and is taught to the curriculum. Within the limitations imposed by differences in facilities, there is one standard course.

COURSE J-495-0414. Five schools offer this course. It is considered a good course but very underutilized. The curriculum is followed at all schools, and thus the course can be considered standard. Two schools reported under 55 percent of the teams who could have been trained actually used the course, and another two schools reported a team utilization rate of under 75 percent. When the teams are converted to numbers of people who could have been trained based on maximum team size, the utilization rate shows a dramatic reduction--two schools under 40 percent, two under 60 percent, and one at 75 percent. This is indicative of ships sending partial teams. The schools are forced to combine trainees from various ships to form adequate sized teams for training.

COURSE J-495-0418. This course is offered by the six schools; however, NDCT Philadelphia, does not advertise its capability in the CANTRAC and maintains record of the number of attendees.

There are three prerequisites for this course: a complete, fully organized team; prior attendance by all team members to course J-495-0412; and the team be led by the designated scene leader. These prerequisites are not honored by many of the operating units sending teams to this course. Fire fighting School, Norfolk, refuses to accept teams with too few numbers or no scene leader. At San Diego the lack of a scene leader is cause for rejecting the team. All other schools accept for training the people sent. If the numbers ordered to training from any one unit are too small, teams are made up from the attendees regardless of the ship of origin.

The course is excellent. One day is sufficient time provided all prerequisites are met; however, unless the prerequisites are met, too much time is required in organizing a team and teaching each member their specific responsibilities. When the prerequisites are not met, 1 day is not adequate time to train the teams and the course is not, for those people, satisfactory. In addition, improperly organized teams return to their ship and are scattered

among the various divisions. They do not again function together. The explicit purpose of the course, team training, is defeated and the ship is not as operationally ready as the training records may indicate.

Utilization rates for this course are as poor as that of course J-495-0414, previously discussed.

COURSE J-495-0426. This is designed to be a weekend course for U.S. Naval Reserves on active duty for training. The course can be either a 1-day or a 2-day course depending on the location. One school teaches the course as J-495-0412 and so reports the attendees. Other schools maintain only sketchy records of attendees. There is a large demand for quotas to attend the course, but the no-show rate is very high. One school which did maintain records had a no-show rate of 50 percent. Training is not standardized and is inconsistent between training sites.

COURSE J-495-2129. Recruit fire fighting is one phase of a 3-day damage control course. Fire fighting is taught in the classroom followed by one-half day extinguishing a simple class B oil spill fire. Graduates can recognize equipment and are familiar with nozzles, hoses, and applicators but are not fire fighters. It is not possible in the time allowed to do more than introduce the recruit to equipment and terminology. Personnel leaving recruit training are not prepared for shipboard duty in terms of fire fighting and fire prevention. The course, with the exception of extinguishing a very simple class B fire, is not hands-on. The course as taught is standard.

The major problems are the student to instructor ratio (approximately 160 to 1 in the classroom) and the lack of hands-on training. Only one RTC gives actual OBA training, and Great Lakes is unable to use the fire field during the five winter months.

COURSE A-495-2037. The portable emergency pump (P-250) course is taught differently at each of the schools. No school teaches the PE-250 pump even though some are in service. There are two basic philosophies extant for this course. The first philosophy advocates that the school operate as a repair facility with instruction taking a poor second. The other philosophy emphasizes instruction, but pump repair plays an important role. Only one school adheres to the curriculum, and this course is not satisfactory because engine overhaul is not taught. Only Norfolk uses school pumps exclusively for instruction; all other schools encourage the trainees to bring a pump from the ship. The school personnel prefer using ship pumps because in this way they can insure at least one pump per ship is operable. Charleston teaches the 3-day course but not on consecutive days. The team arrives with its pump, strips it, and determines what parts are needed. They return to their ship, obtain the parts, and, a week later, return to the school and complete the course. Charleston must use the pumps from ships; theirs were turned in late in 1978 for replacement and have not been returned.

At some schools, instructors complained that the persons trained on the P-250 were not the persons responsible for its maintenance aboard ship. This means the school is being used as an overhaul facility, not a teaching facility.

There is a major problem associated with the basic equipment, the P-250,

which impacts training. Spare parts are becoming increasingly difficult to obtain. The schools have done some stockpiling of parts, so they are capable of overhauling pumps, at least for the time being. However, even the schools are finding spares more difficult to obtain. With the advent of the PE-250, new problems are anticipated. The crankshaft can be removed, but the construction is such that seals and pistons cannot be removed from the crankshaft. Thus, this entire unit will have to be returned to the manufacturer for overhaul. This may cause problems in that the pump overhaul will extend beyond the allocated 3 days if subassemblies must be returned to the manufacturer.

Records of attendees at this course are extremely unreliable. Most schools will run this course for fleet units on an as-requested basis. Frequently the special courses are not reported. For example, quota control for one school reported 35 teams trained during the period January to June 1979. Yet the school had records of 41 teams trained during this same period. Another school, which acts more as a repair facility, estimates it overhauls, sometimes without the aid of ship personnel, as many pumps outside of reported or convened classes as it does during conducted reported courses.

The P-250 course is not satisfactory. It requires updating and standardization. Schools are not repair facilities, and they should not perform this function. By so doing they discourage ships from training their own people. The engine should be overhauled during the course since two of the major PMS procedure omissions are (1) the failure to flush after use which allows the corrosive effects of salt water to damage machinery and (2) the failure to stow properly the P-250 which can cause the engine not to start.

COURSE J-495-0050. The foam generating system course is taught at one location on each coast. The course encompasses 7 working days (which means 9 consecutive days), yet one quota control reports the course as 9 days duration. This could cause problems in scheduling.

Material taught includes the FESTA and installed high capacity systems. At this time there are at least five different high capacity systems installed in the fleet. This means there are six systems which must be covered during a 7-day period. Instructors felt that too much material must be covered in the time allocated. An additional complication is that at least one system does not have its spare parts in the Navy supply system, and manufacturer's instruction books are scarce. Spare parts must be ordered by the manufacturer's part number, and this is difficult and time consuming.

Although the course is good, and appears to be effective, it has a comparatively low utilization rate, 52 percent on the east coast and 46 percent on the west coast. The west coast utilization rate would drop to 30 percent if standbys were not accepted. To attend this course students must be away from their ship for a total of 10 days. Many trainees require only the FESTA or the FESTA and/or one high capacity system. This course should be divided into units with each unit composed of one system. Students should be permitted to attend courses which include only the units they need. A much higher utilization would probably be achieved and fleet needs better served.

COURSE J-495-0400. NWIP-50-3A describes the DCPO as a chief petty officer. This is not practical, yet the position requires a senior petty officer

with a sound Navy background. Prerequisites to the course specify the trainee should be rated, yet, depending on the school, at least 15 percent of the students are nonrated.

The course is not fully satisfactory from the fire fighting equipment maintenance aspect because inspection techniques are not taught and PMS is not emphasized. There is no hands-on time except at the two schools which teach the DCPO course as a 2-day rather than a 1-day course. The curriculum is not standard, and complaints were received that the procedures taught in the classroom differed from the fleet and fleet inspection team demands.

SECTION IV

MANAGEMENT AND ENVIRONMENTAL INFLUENCES ON TRAINING

Two additional considerations influence the training effectiveness of the schools. These are the training environment and the management of training. The training environment influences are those which originate from the facilities, regulatory restraints, funding restraints, and equipment problems. The training management influences are those concerned with the orderly conduct, control, and recording of instruction.

The material presented in this section resulted from discussions with school personnel. It is primarily subjective in nature and reflects the consensus of instructors and managers.

ENVIRONMENTAL INFLUENCES

Environmental influences vary from school to school and coast to coast. Each of the major influences is discussed as it affects each school.

FACILITIES. All fire fighting facilities consist of classroom and laboratory areas. Classroom areas are adequate at all schools. Laboratory areas consist of a number of buildings designed to have fires lighted and extinguished therein, open pits, tanks, and demonstration areas.

Training is only peripherally related to fire fighting aboard ship in the operational courses. No building resembles a ship space; rather they are designed to produce a particular type of fire environment for training. Shipboard equipment is used, but the techniques employed are dictated by the facilities layout. There are no secondary effects; i.e., equipment damage or failure, secondary fires, flooding, etc. With the exception of NTTC, Treasure Island, no vertical descent to the fire is possible.

There are no facilities at any school for a class C fire. Students are taught by demonstration only. Class D fires are only taught in the classroom and only at some schools. Class A fires are fought only in course J-495-0418, and even these fires are a simulation in that oil is poured on wood and ignited. Post-fire procedures are not taught in a meaningful way because of the facilities layout.

Emergency/casualty repairs and routine maintenance are generally performed by the fire fighting school instructors. At some installations, assistance in the daily clean-up is provided by transient or other temporary personnel assigned to the base. Maintenance billets, so designated, often do not exist. When they do exist they are not filled, or are not filled in adequate numbers.

REGULATORY RESTRAINTS. National, state, and local environmental regulations, which must be met by the schools, provide severe restrictions to training. The effect is not equal at all schools. West coast facilities are the most severely affected at this time. At NTTC, Treasure Island, there are frequent nonpermissive burn days when no fires are permitted. In addition, no open

tank fires are ever possible. The Fire Fighting School, San Diego, must shut down when the ambient temperature reaches 90° F, a situation which occurs with regularity during summer month afternoons. Training cannot be shifted to morning hours because recruit training occupies the laboratory each morning. East coast facilities continue to operate despite a large volume of pollutants; however, this situation could change at any time. It is apparent that a nonpollutant fire environment is imperative if training is to continue under existing requirements.

The water run-off from fire extinguishment is a minor problem today. Separators extract the oil from waste water which can then be discharged to public facilities. However, the use of Aqueous Film Forming Foam (AFFF) for training may present serious environmental pollution problems. Public treatment facilities are not designed to handle this substance, and it can be detrimental to marine life. Until an inexpensive treatment, or a simulated substitute, is developed, extensive training using AFFF may not be practical.

FUNDING RESTRAINTS. Schools are performing within their approved budgets. However, this is being accomplished because of the ingenuity of the instructors in that great use is made of salvaged materials.

Budget allocations have not increased appreciably in recent years, yet all costs are rising. For example, one school reported an increase in fuel costs of better than 37 percent in the last year, yet OPTAR funds were reduced by 33 percent. The cost of operating the smoke abatement system in San Diego consumes 64 percent of the quarterly allotment. The use of canisters for OBAs is restricted, in part, because of their cost. NTTC, Treasure Island, has every student in course J-495-0412 wear an activated OBA when fighting a fire. The cost of the canisters alone requires the use of 80 percent of the OPTAR funds.

EQUIPMENT PROBLEMS. Two types of equipment are in use at all fire fighting schools: (1) installed equipment required in school operations and (2) portable equipment similar to, or duplicating, shipboard fire fighting equipment used for teaching. Installed equipment is generally maintained by public works. In terms of routine maintenance and scheduled overhaul, this support is adequate. Casualty or emergency repairs are usually performed by instructors because public works is too slow to respond. Only one school reported any loss of training due to inoperative installed equipment. This remarkable record can be attributed to the dedication of assigned instructors and their willingness to work long hours.

Portable equipment includes training aids, safety equipment, and fire fighting equipment. Training aids are a serious problem, particularly in terms of new equipment being introduced to the operational forces. The schools are unable to maintain an inventory of the most recent additions. For example, only one school had the new PE-250, and they had only one pump. The fog/foam systems being installed on aircraft capable ships, particularly carriers, are not available to the schools. Many twin agent trucks are obsolete and no longer in fleet operational use; the schools find it impossible to obtain the current model. No school had a Halon system to demonstrate the operation and maintenance aspects with which ship personnel must be

[illegible]. Films are old and require updating to illustrate the [illegible] equipment in an existing ship type employing up-to-date techniques.

Safety equipment is adequate and available; however, there [illegible] ment with respect to its use. Rubberized rain gear is worn by [illegible] exposed to a fire situation. Some schools feel it is satisfactory [illegible] burns. Other schools expressed the opinion that the rubberized [illegible] conducts and holds heat and may be dangerous. The incidence of [illegible] small and could be related to other causes such as not wearing [illegible] shirts or the wearing of shirts of synthetic material. The rain gear [illegible] used appears satisfactory.

Instructors who enter the fire environment on a continuous basis [illegible] available bio-packs to preclude the inhalation of smoke. Only two schools made use of these packs even though there is a voice amplifier. In lieu of the bio-pack, instructors wear a gauze mask. A medical opinion is [illegible] appropriate directives issued and enforced to insure that lung damage [illegible] caused by the failure to wear these protective devices should they be needed.

Fire fighting equipment is generally satisfactory. The nonavailability of modern versions of FESTA and the PE-250 has been discussed. The most serious problems arise from the extreme difficulty in obtaining parts for the P-250 and canisters for the OBA. To date they have been available; however, indications are these vital spares are fast disappearing.

TRAINING MANAGEMENT INFLUENCES

Existing fire fighting training is not organized as a training [illegible] as a series of related courses. In addition, there is no known [illegible] of control, or "czar," to insure standardization of training at [illegible] excluding recruit training, there are seven schools managed by [illegible] attempting to meet a series of vague training requirements for an [illegible] number of people.

QUOTA CONTROL. Quota control is at the parent command except at [illegible] In that one case, quotas are controlled and records are maintained. The present system generally has quotas for the various courses [illegible] months in advance. Fleet Training Centers (FTCs) are located within [illegible] distance of the operating units, and the operational fire fighting [illegible] are no more than 2 days in length. The lead time appears excessive [illegible] of existing conditions. In addition, ships requiring operational [illegible] ing training frequently have unexpected opportunities to take advantage [illegible] these short courses while in port. Fire Fighting School, San Diego, [illegible] instituted a standby system which helps reduce the number of [illegible] unused quotas as well as allowing ships to take advantage of [illegible] tunities. An allocation system is needed which reduces lead time [illegible] than 2 weeks.

Official records of attendees are originated at the school [illegible] at quota control, located at some distant point. A check of [illegible] records against the records at quota control uncovered some [illegible] Special courses were conducted by the school at the request of [illegible] frequently these were not reported. It was extremely difficult [illegible]

mpossible to determine the category of attendee at classes; that is, whether he attendee was officer or enlisted, USN, USNR, USCG, or from another agency. lthough a computer was used to record attendance and the category of attendee t the classes, no quota control was capable of retrieving this information nd all attendance figures were acquired from hand prepared records. Fleet raining Center, San Diego, computerized records independent of the COMTRAPAC uota control, and these were complete, agreed with school records, and etrievable.

NSTRUCTORS. Only one school had, over the 6-month period from January to uly 1979, its full allowance of instructors on board. The remainder of the chools had shortages which varied between 25 percent and 33 percent. At the ire Fighting School, Norfolk, this shortage was a limiting factor on quotas ssued.

Table 10 shows the school instructor-student ratios at the FTCs for the ive fire fighting courses taught outside of recruit training which bring the rainee into direct contact with fire (operational courses).

TABLE 10. ACTUAL INSTRUCTOR-STUDENT RATIO AT FTCs FOR 6-MONTH PERIOD

	Student Total	Average # Inst	I/S Ratio
Norfolk, VA	8,792	22	1:400
San Diego, CA*	10,002	44	1:227
Mayport, FL	3,908	10	1:391
Charleston, SC	1,210	9	1:134

*Fire Fighting School, San Diego, requires additional instructor billets to accommodate fire fighting training given daily for ½ day to recruits. The ratio in this instance is deceptive.

These ratios are only indicators with respect to any individual course r class convened. They do indicate a probable difference in instructor load ver an identical period of time and/or differences in efficiency assuming qual effectiveness. The difference is of such magnitude that management hould investigate this phenomenon in order to balance the load among schools.

RAINING SCHEDULE DISRUPTIONS. Late scheduling of training for precommission- ng details and ships in a Training Availability Week badly disrupt schedules. n some cases these actions have caused the cancellation of general quotas. riority quotas should be issued well in advance, if possible, and certainly rior to the issuance of general quotas.

OURSE PREREQUISITES. The acceptance for training of students who do not eet the stated prerequisites reduces training effectiveness and may present false picture of the state of readiness of an operational unit. Management hould insure that all prospective students meet the prerequisites as published n the CANTRAC.

deficiency classifications. To preclude the maximum score of a system/equipment with a major criticality classification equaling the minimum score of a system/equipment with a minor criticality classification, one point was added to the maximum score of the major criticality classification scores. This means the lowest score for an equipment/system with a minor criticality classification is 22. Thus, the maximum score for systems/equipments with a minor deficiency criticality classification is established as 43 (22 + 12 + 9). Using an identical rationale, 44 was established as the score for systems/equipments with no (none) deficiency criticality classifications.

TABLE A-5. NUMERICAL CONVERSION VALUES

DEFICIENCY DESCRIPTION FACTOR		NUMERICAL VALUE
1.	Criticality Classification	--
1.1	Major	21 (Maximum)
1.2	Minor	43 (Maximum)
1.3	None	44 (Maximum)
2.	Deficiency Type (1)(2)(3)(4)(5)(6)	2 (Each deficiency type)*
3.	Deficiency Cause (a)(b)(c)(d)(e)(f)(g)(h)(i)	1 (Each deficiency cause)

*Each deficiency type was assigned a value of 2 since it was more critical to training than a deficiency cause which was assigned a value of 1.

Thus, the better the material condition of the equipment/system, the higher the score. A perfect score is 44.

Table A-6 represents the conversion of the system/equipment maintenance condition description data presented in table A-4 to numerical expressions. The conversion is accomplished by first identifying the maximum numerical score for the system. This is determined by the criticality classification assigned. The final score is calculated by subtracting from the maximum possible score two points for each deficiency type and one point for each deficiency cause. This procedure is expressed by the following equation:

$$MCS = CC_{max} - 2N_t - N_c$$

where MCS = Maintenance Condition Score
CC_{max} = Criticality Classification Value
N_t = Number Deficiency Types
N_c = Number Deficiency Causes.

Only one criticality classification was assigned for each system/equipment evaluated in the report: however, as many type and deficiency cause factors as necessary were used to describe the maintenance condition of the system/equipment. Documentation of this step of the procedure is not included in this appendix, however, table A-4 illustrates, with actual data, the data recording format used.

TABLE A-4. STEP 1 DATA RECORDING FORMAT

SYSTEM/EQUIPMENT CLASSIFICATION	SHIP		
	AD-1	AD-2	LPD-43
FP-180 Pump	A/1,6	C	B/1/h
P-250 Pump	A/1,5/e	A/6/i	A/1,2/a
Submersible Pump	C	A/6/e	B/3

Using the FP-180 pump for illustrative purposes, the data in table A-4 are interpreted as follows: the maintenance deficiency condition of the FP-180 onboard ship AD-1 is major (A) and this condition is attributed to maintenance (1) and inoperative (6) type deficiencies; no causes were included in the inspection report. Conversely, the FP-180's onboard ship AD-2 have no deficiency (C) and are in excellent condition. Minor deficiencies (B) were noted for the FP-180's onboard ship LPD-43 with maintenance (1) being the type of deficiency and out of calibration (h) being the cause of the deficiency.

Each system/equipment onboard each ship inspected was described as illustrated above. Data indicated that not every ship class was equipped with every system/equipment, and an N/A was entered to describe this situation. Provisions for this situation are included subsequently in Steps 2 (Numerical Description) and 3 (Mathematical Analysis).

STEP 2. Numerical Description. It was required to convert the system/equipment maintenance condition descriptions to numerical expressions. To accomplish this conversion, a procedure for assigning numerical scores to the components of each of the three primary Deficiency Description Factors was devised. These factors with their assigned numerical value are listed in table A-5.

The maximum numerical value given a system/equipment with a Major deficiency classification was established as the sum of the six deficiency types multiplied by an assigned value of 2 (12 points) added to the sum of the nine deficiency causes multiplied by an assigned value of 1 (9 points). This establishes 21 as the maximum numerical score for a system/equipment in any criticality classification. The maximum score for systems/equipment in other criticality classifications was obtained by adding the six deficiency types (12) to the sum of the nine deficiency causes and subtracting this to the minimum score to systems/equipments with Major

TABLE A-3. EQUIPMENT MAINTENANCE CONDITION DESCRIPTION FACTORS

Description Factor	Factor Symbology	Definition/ Clarification
. CRITICALITY CLASSIFICATION	--	Only one classification may be used.
.1 Major	(A)	Deficiency(s) which produces an unsafe situation and/or significantly reduces the effectiveness of the equipment.
.2 Minor	(B)	Deficiency(s) which do not produce an unsafe situation and do not significantly reduce the effectiveness of the equipment.
.3 None	(C)	No deficiencies noted for the equipment.
. TYPE DEFICIENCY	--	More than one type deficiency may be used to describe condition.
.1 Maintenance	(1)	Improper or unperformed maintenance.
.2 Inspection	(2)	Improper or unperformed scheduled PMS inspections.
.3 Installation	(3)	Improper installation of equipment or equipment part.
.4 Other	(4)	All deficiencies not included under 2.1, 2.2, or 2.3.
.5 Missing	(5)	System/equipment not onboard ship.
.6 Inoperative	(6)	System/equipment completely inoperative.
. DEFICIENCY CAUSE	--	More than one cause may be used to describe condition.
.1 Missing Parts	(a)	Equipment/system parts missing--used whether or not parts are on order.
.2 Documentation	(b)	Documents missing or not current--includes missing labels, operating instructions, and maintenance records.
.3 Nonstandard Parts	(c)	Nonstandard and/or unauthorized parts used in repair.
.4 Frozen/Clogged	(d)	Pipes, hoses, valves, openings, etc., frozen or clogged.
.5 Safety Hazard	(e)	Installation and/or repair procedures result in a potential personnel safety hazard.
.6 Deterioration	(f)	Deficiency due to deterioration or excessive shelf life.
.7 Fire Hazard	(g)	Improper storage of combustible and/or equipment creating fire hazard.
.8 Calibration	(h)	System/equipment not calibrated or out of tolerance.
.9 Improper Stowage	(i)	System/equipment improperly stowed.

TABLE A-2. MAJOR F/F EQUIPMENT/SYSTEM CLASSIFICATION

EQUIPMENT/SYSTEM CLASSIFICATIONS	
1. FP-180 Pump	13. Magazine sprinklers
2. P-250 Pump (portable)	14. Flame arrestors
3. Submersible pump	15. Flash screens
4. Firepump	16. Audible and visual alarms
5. Firemain	17. OBA (oxygen breathing apparatus)
6. Fog foam system	18. OBA training kits
7. CO_2 smothering system	19. Survival support devices
8. Portable CO_2 system	20. Portable blowers
9. Twin agent system	21. Compartment checkoff/DC plates
10. PKP portable system	
11. Water curtain	
12. Countermeasures system	

Second, the data were used to identify the types of maintenance deficiencies and causes of deficiencies peculiar to F/F equipments/systems. Determination of the maintenance deficiency was necessary for the development of a procedure for evaluating the maintenance condition of F/F equipments/systems in the fleet. The procedure developed is discussed subsequently together with its application in estimating a ship's overall F/F capability. The results provided by the procedure appear useful in identifying potential F/F equipment maintenance training deficiencies and for providing a guide to managers in estimating fleet training requirements.

DATA REDUCTION AND ANALYSIS PROCEDURE. The INSURV reports presented ship inspection findings in narrative form to describe the maintenance condition of the F/F equipments/systems. Because of the format of these data, it was necessary to develop some form of quantitative expression that would permit positive scoring and ranking of F/F equipment relative to maintenance conditions and maintenance problem areas. Five basic steps were undertaken in the data reduction and analysis procedure. These steps are listed below.

STEP 1. Maintenance Condition Description. Analysis of the INSURV reports resulted in the identification of three primary Deficiency Description Factors which would provide a comprehensive description of a system/equipment maintenance condition. These factors, criticality classification, type deficiency, and cause(s) of the deficiency, are listed with their respective elements in table A-3. Each report was reviewed, and the maintenance condition of each type of F/F equipment listed in table A-2 was described using the factors presented in table A-3.

The symbology presented in table A-3 was developed by TAEG in order to connect word statements in the Sub-Board of Inspection and Survey reports with classifications which could be analyzed.

TABLE A-1. SHIP CLASSES INCLUDED IN F/F EQUIPMENT MAINTENANCE ANALYSIS

SHIP CLASS							
1.	AD	6.	AOR	11.	CGN	16.	LPD
2.	AE	7.	AR	12.	DD	17.	LPH
3.	AFS	8.	ARS	13.	DDG	18.	LSD
4.	AO	9.	AS	14.	FF	19.	LST
5.	AOE	10.	CG	15.	FFG	20.	MSO

In addition to the 55 INSURV reports, 11 aircraft carrier inspection reports prepared by the Fire Fighting Assistance Teams (FFAT) were reviewed. The data contained in these reports were incomplete and, hence, could not be included in the F/F equipment maintenance analysis. For this reason, carriers are not among the ships listed in table A-1.

DATA LIMITATIONS. Inspection and Survey reports were selected as the data source for the F/F equipment maintenance analysis because (1) the data represented the findings of shipboard inspections performed by dedicated subject matter experts, (2) an acceptable sample of ship classes and fire fighting systems were included in the reports, and (3) the reports were readily accessible. There are, however, certain limitations in the data beyond the control of analytical treatment. Although these limitations should be recognized in reviewing the data presented later in this appendix, it is not anticipated that they would have any significant impact on the findings derived from the data analysis. These limitations are:

1. Inspections conducted by different personnel may not be equally thorough or complete.

2. Different inspection personnel may emphasize different F/F equipment and/or maintenance areas.

3. Maintenance conditions of some equipment may be attributable to age and/or design factors.

4. All F/F systems may not have been inspected on all ships. Data were extracted on all systems mentioned in the reports. If a system was not discussed, it was presumed to have no deficiencies.

DATA UTILIZATION. Data from the INSURV reports were used for two primary purposes. First, they were used in conjunction with other Naval ship and equipment information to identify major F/F equipments/systems in use aboard Naval ships and on which class of ship each type of equipment/system was used. These equipments/systems were combined into the 21 primary equipment/system classifications listed in table A-2. A small number of systems such as the FP-1000 pump were not included in the table A-2 listing for various reasons. In the case of the FP-1000, the equipment is part of a larger system and its status regarding Fleet acceptance is in a state of flux.

APPENDIX A

FIRE FIGHTING EQUIPMENT MAINTENANCE TRAINING DEFICIENCY ANALYSIS

INTRODUCTION

The ability of a ship's crew to perform effectively in a fire situation is a function of the fire fighting (F/F) training received by the crew and the effectiveness of the equipment used to combat the fire. If the effectiveness of the shipboard fire fighting equipment is below minimum acceptable operating standards, no amount of personnel training will enable the fire fighting team to effectively combat the fire.

The importance of a problem identification examination of Navy shipboard F/F equipment is evident, particularly as it relates to training. This is especially true when one considers that the effectiveness of shipboard fire fighting equipment is dependent upon the quantity (time) and quality (excellence) of maintenance provided to such equipment. The quantity of maintenance is a variable controlled primarily by the priority assigned by the ship's commanding officer and varies from ship to ship. This subject is not addressed in this report since it is beyond the scope of this investigation. Quality of maintenance, however, is dependent to a large extent on the quality of the equipment maintenance training programs provided to Navy personnel. An indicator, but not necessarily a measure, of F/F equipment maintenance training effectiveness and areas of deficiencies, is the operational condition of F/F equipments/systems in the fleet. For example, if a certain type of equipment is repeatedly in a state of disrepair due to a specific type of maintenance condition and specific cause(s) for the condition, it is probable that there is a deficiency in maintenance training for this type equipment. Similarly, a specific maintenance condition and cause repeatedly occurring for a majority of different types of equipment could be an indication of a training deficiency.

OBJECTIVE

The objective of this portion of the study was to (1) determine the overall operational condition of all major types of F/F equipment used aboard ship and (2) identify the major types of maintenance problems and their causes. These data were used to isolate potential F/F equipment maintenance training deficiencies.

TECHNICAL APPROACH

DATA. Data required to assess the maintenance condition of shipboard F/F equipment were extracted from the Damage Control section of Inspection and Survey (INSURV) reports prepared by the Sub-Board of Inspection and Survey, Atlantic, and Sub-Board of Inspection and Survey, Pacific, to document deficiencies noted during the inspection of various U.S. Navy ships. A total of 55 reports (20 for the Atlantic Fleet and 35 for the Pacific Fleet) were used in the analysis. Individual reports were prepared for each ship inspected. The 20 different classes of U.S. Naval vessels represented in the INSURV reports are listed in table A-1.

directives should be issued and enforced to insure instructor lung damage is not caused by the failure to wear these protective devices.

ENVIRONMENTAL.

12. Funding has become a critical issue at all schools in terms of both operations and training aids and devices. CNET should investigate the need for increased funding for fire fighting training.

PROCEDURES/REQUIREMENTS.

13. The reports submitted by the school to the ships which indicate areas of PQS covered at the school should be performance based. This can be either accomplished by a written test covering classroom instruction or by instructor opinion of student performance.

14. All courses should increase emphasis on inspection procedures and techniques and PMS. A short course is needed to qualify senior personnel as shipboard fire fighting instructors.

15. Reexamine reserve fire fighting training requirements to establish a standard course of instruction at all facilities. A formal procedure for quota assignment and reporting should be jointly developed by CNET and the Chief of Naval Reserves, and all quotas requested, assigned, and filled should be reported to NITRAS.

16. Expand the General Shipboard Fire Fighting Training course, J-495-0412, to a minimum of 4 days to permit teaching of all required material.

17. No student should be accepted in course J-495-0412 who has attended within the prior 6 months, or who has less than 3 months obligated service.

18. For team training courses, schools should not accept teams that do not meet all prerequisites or are incomplete.

19. Course A-495-2037 on the portable emergency pump requires revision and standardization. The revised course should insure school pumps are used for instructional purposes at all locations.

20. Divide the Foam Generating System course, J-495-0050, into units with each unit covering one system. Ships should be permitted to request quotas only for those units wherein training is needed.

21. Revise the Division DCPO Indoctrination course, J-495-0400, into a 2-day course. Inspection procedures and techniques and the PMS of fire stations require emphasis.

POLICY.

1. Development of the 19F series of fire fighting training devices should be expedited. These devices more closely resemble shipboard spaces and allow for a vertical approach to the fire. In addition, all classes of fire can be simulated. The completion of these devices should overcome the environmental restrictions which are affecting training.

2. CNET should be on the distribution for fire fighting equipment maintenance inspection reports. These reports are needed to derive maintenance training requirements. The analytic method outlined in appendix A can be employed for this purpose.

3. Designate a single point of contact at CNET to coordinate and direct all fire fighting training. Reorganize the training into an integrated training system with standard instruction at all locations.

4. OPNAVINST 3541.1B is undergoing revision at this time. CNET should insure a definition of advanced fire fighting training is included in the revised version.

5. CNET should request fleet and type commanders to review and revise their instructions to reflect specific types of operational and maintenance training required and the numbers of expected attendees on an annual basis.

6. Graduates of recruit training should be ordered to operational units via a fire fighting school.

7. Establish attendance at course J-495-0412 as a prerequisite for course J-495-0414.

MANAGEMENT.

8. Quota control for fire fighting courses should be as close to the school as possible. At least 50 percent of the quotas should be reserved for operational units and not assigned more than 2 weeks prior to the course convening date. The standby system developed at FTC, San Diego, should be considered for adoption at all schools.

9. Quota control should maintain complete records of quotas requested, issued, and used, as well as persons trained on an ad hoc basis. These should include the category of student. Team training records should be maintained so that the number of teams and the number of members of each team are identifiable. Data submitted to NITRAS should be verified and reported back to NITRAS.

10. The difference in instructor to student ratios at the four fleet schools is of such a magnitude that an examination of this phenomenon is indicated.

11. As a safety measure bio-packs are available for instructor use, but not all instructors use them. A medical opinion is needed, and appropriate

32. Only 17 of the 55 ships surveyed had an ORF for fire fighting equipments and systems adjudged to be acceptable or better. Ships should be graded to a standard. With this information available, commanding officers can request appropriate training for particular numbers of people.

33. Reserve aircraft fire fighting training as presented in course J-495-0426 is not standardized or consistent in the amount of time devoted to the course. Accurate and complete records of attendees, quotas available, and quotas issued are not maintained. This course is not satisfactory.

34. All areas of fire fighting training specified as required for shipboard sailors are not covered during recruit fire fighting training. This training is introductory and does not prepare the student for shipboard duty. Classroom instruction is not satisfactory primarily because of the instructor to student ratio (1 to 160) which effectively precludes questions and the clarification of confusing points.

35. Course J-495-0412 is not of sufficient length to teach all of the material required by existing directives and is not standard at any two schools. The course is not satisfactory.

36. Course J-495-0412 is poorly attended by officers and senior enlisted personnel, and, therefore, the adherence to the refresher training cycle for these people is suspect.

37. Course J-495-0414 presumes that students have knowledge of equipment and the techniques of equipment handling. Yet there are no prerequisites to attendance at this course.

38. The Portable Emergency Pump (P-250) course is neither standard nor satisfactory. Some schools act as repair facilities instead of instructional facilities. The curriculum does not include engine overhaul, and engines are a primary source of trouble with this equipment. School pumps rather than ships' pumps should be used for instructional purposes to insure standardization of instruction. Spare parts are extremely difficult to obtain.

39. The new PE-250 pump is a potentially serious problem for the maintenance technician and instructor. The construction of the crankshaft may preclude organizational level maintenance.

40. Course J-495-0050, Foam Generating System course, is standard and satisfactory. However, too many systems are being taught. This may be a partial cause of low utilization rates.

41. The DCPO course is not of sufficient length to emphasize the PMS and inspection responsibilities of the DCPO. In addition, the curriculum is not standard and the procedures taught may differ from fleet and fleet inspection team demands.

RECOMMENDATIONS

Based on a review of the conclusions presented, the following recommendations are made:

numbers game; sufficient numbers of sailors are sent to school to satisfy inspection requirements, but these are not necessarily the proper people.

22. Ships are sending partial teams to course J-495-0414 which means the ship's team is not trained as a unit.

23. The prerequisites for course J-495-0418 are not met a significant proportion of the time. This can cause a serious degradation of training. Schools are inconsistent in their handling of incomplete teams.

24. NDCTC, Philadelphia, presents course J-495-0418 on a request basis. This capability is not listed in CANTRAC nor are attendees reported to quota control.

ENVIRONMENTAL.

25. Fire fighting school funding is borderline at this time. The successes achieved are due to the ingenuity and dedication of the instructors. Unless budgets are increased, the schools can expect equipment condition and effective training to deteriorate.

26. Training aids and equipment used by the schools for instructional purposes are not totally satisfactory. Training aids, particularly films, are obsolete and require updating. Much equipment is obsolete or not available.

27. There is no question that the federal, state, and local environmental regulations have degraded fire fighting training. It is conceivable that even this degraded training may be further curtailed unless new instructional methods and new fire field facilities are introduced.

28. No physical facilities resemble a ship's space nor was an attempt made to simulate a ship. Team and advanced training suffers from the inability of the schools to approximate conditions as they exist aboard ship. In effect, only one class of fire (class B) is taught. Yet class A and class C fires occur aboard ship with a relatively high frequency.

PROCEDURES/REQUIREMENTS.

29. There are no quantitative indices for how well people performed in any of the operational fire fighting courses. Students who attend, stay awake, and do not bolt from the fire are reported to the ship as having been exposed to various PQS requirements. All students, including team members in team training courses, are reported identically in terms of PQS even though all men are not trained identically.

30. Inspection procedures and techniques are a vital fire prevention measure aboard ship, yet no school places emphasis in these areas.

31. A comparatively small number of types and causes of maintenance deficiencies accounted for a preponderance of maintenance problems in fire fighting equipment. Training programs should be structured to emphasize these types and causes of maintenance deficiencies.

MANAGEMENT.

12. It is difficult for CNET and his functional commanders to establish exact or even make reasonable estimates of the numbers who require training.

13. Quotas are assigned, with one exception, at the school's parent command. These quotas are assigned as much as 6 months in advance of course convening dates. Since (1) all operational courses and all but one of the remaining courses are 3 days or less in length, (2) this training can be provided on an ad hoc basis, and (3) ships can release persons for this training as the opportunity presents itself, a method of assigning quotas not to exceed 2 weeks in advance of course convening date should be considered.

14. A large number of persons are trained and not reported. Others are trained and reported, but it is not possible to identify their category (i.e., USN, USNR, USCG, civilian, etc.). Complete records should be maintained of all personnel trained and their category.

15. NITRAS reports should provide a basis for planning as well as recovering reimbursable funds. Existing reports are not complete. The input to NITRAS is from quota control, and there are serious discrepancies between numbers and categories of persons between these two agencies. Quota control personnel did not understand or know the uses of NITRAS reports. In addition, they reported no feedback from NITRAS for verification.

16. Course utilization rates and the percentages of no-shows indicate a lack of use of available training at all schools.

17. The standby student procedure developed at FTC, San Diego, is an effective means of providing needed but difficult to attain training and of increasing utilization rates.

18. The shortage of designated instructor billets is as high as 33 percent. This can limit the quantity of instruction offered. Instructor/student ratios are not consistent among schools which may indicate a serious imbalance of workload.

19. Safety equipment provided instructors is not always used. There is a difference of opinion among the instructors as to its value. An investigation is needed in this area to determine if the equipment should be universally used or discarded.

20. Emergency/casualty repairs and some routine maintenance are performed by instructors. Instructor load is such that these duties could affect their effectiveness; and where routine maintenance includes general housekeeping chores, it has degraded morale.

21. The number of repeats within 6 months, and the number of trainees with less than 3 months obligated service attending course J-495-0412 is significant. Of equal importance, student attitude is poor and efforts should be directed, as was done at NTTC, Treasure Island, toward improving student attitude. In addition, some operational units appear to be playing a

SECTION V

CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations of this study are organized into four areas: policy, management, the training environment, and training procedures/requirements.

CONCLUSIONS

POLICY.

1. There are seven schools managed by three commands attempting to meet a series of vague training requirements for an unspecified number of people. Fire fighting training is not systemized, rather it is a series of related but not integrated courses.

2. Advanced fire fighting training is required by CNO directives, yet advanced training is not defined.

3. OPNAVINST 3541.1B requires that certain specified senior personnel be qualified as instructors. No training is provided to qualify these persons.

4. Subordinate LANTFLT directives deviate from the stated policy of CNO and CINCLANTFLT.

5. COMNAVAIRLANT instructions do not identify the specific personnel to be trained and the training they require. This could lead to confusion between ships and prevents CNET from identifying the numbers of persons who require training.

6. COMSUBLANT does not establish mandatory quotas for operational fire fighting training.

7. Shipboard Fire Fighting Team Training course J-495-0418 is not referenced in COMSURFPAC directives. This is the only course designed to train repair party and in-port emergency teams.

8. COMNAVAIRPAC establishes a refresher training cycle which appears to be dependent upon the number of courses previously attended rather than billet assignment.

9. Only COMSUBLANT specifies a required fire fighting equipment maintenance course.

10. The term "in the vicinity of the flight or hangar deck" as used in CINCLANTFLTINST 3541.1B is not defined. This could lead to confusion as to who requires what training.

11. The survey identified 11 of 21 equipments/systems as less than acceptable. There is need to classify fire fighting systems and equipments with respect to their material condition. This will aid type commanders in identifying potential problem areas and permit CNET to review courses to insure the needed material is taught.

No fire fighting course teaches inspection procedures in terms of fire prevention and fire fighting equipment installation. It is mentioned during recruit training, and referred to in the classroom during one operational and all maintenance courses, but given no emphasis. This phase of fire fighting/fire prevention is left to on-the-job training. The reports of the Sub-Boards of Inspection and Survey uncovered many and repeated instances of the existence of fire hazards aboard ship which should have been discovered during routine DCPO inspections, and others which resulted from improperly installed equipment. More emphasis is required in this area.

Two facets of PMS procedures aboard ship disturbed the instructors and led them to attribute many of the fire fighting maintenance problems to a lack of PMS performance. The amount of time to perform PMS and routine inspections is such that this is a full-time job. Yet, generally, the DCPO position is a collateral job and routine ships work and operational equipment maintenance takes priority. As a group, the instructors had serious doubts that specified PMS procedures were followed or completed. This was reinforced during the computation of the ERs of various fire fighting systems and equipments. The second facet pertains to the HTs assigned to "R" division. The HT rate consists of approximately six technical skills or trades. The least glamorous and most unrewarding is damage control. The instructors stated that, from their observations, HTs gravitated away from the damage control portion of the rate for the more visible, recognized skills such as welding and ship fitting.

The relative lack of seniority of the DCA aboard ship was of concern. He does not have the experience or the seniority to enforce proper procedures or to insure that the correct people attend fire fighting school. The primary examples used to illustrate this point were the number of repeats and short timers sent to the basic courses. Ships appeared to be playing a numbers game; sufficient numbers were sent to school to satisfy inspection requirements, but these people were not necessarily the proper people. Teams sent for training, particularly for course J-495-0418, are supposed to be organized and with a scene leader. Fully organized, complete teams arrive at the school less than 75 percent of the time.

No fire fighting course has a criterion or standard of proficiency which must be met by the trainees. Any student who attends, stays awake in the classroom, and does not refuse to approach the fire, passes the course and is reported to his ship as having been exposed to various Personnel Qualification Standards (PQS) items. With no testing procedures, either objective or subjective, all trainees in a given course are reported identically in terms of PQS qualifications. This can give an operational commander a false sense of security. He may overestimate the capabilities of the crew when faced with an actual fire situation.

OPNAVINST 3541.1B requires that certain specified senior personnel be qualified as instructors. No training is provided to qualify these persons.

COLLATERAL DUTIES. Fire fighting instructors are senior petty officers and above. In addition to actual instruction, they are required to make preparations for instructional duties and to perform some maintenance. They should not be required to perform janitorial and routine clean-up jobs as this could have a deleterious effect on training as well as on morale.

NAVY INTEGRATED TRAINING RESOURCES AND ADMINISTRATIVE SYSTEM (NITRAS). Input to NITRAS is from quota control. This means that unreported training given at the schools does not appear in NITRAS reports. Attendance figures, organized by category of attendee and the activity from which the student came; i.e., USCG, USNR, USN, civilian, should be identical whether the figures are derived from quota control or NITRAS for each school. This is not the case. For example, NITRAS was requested to provide, for the period covered by this study, a listing of attendees at each school by category. These numbers were compared with the reported numbers obtained from quota control. For course J-495-0412 the variation ranged from a NITRAS reporting of 58 percent less students than quota control to NITRAS reporting of 4 percent more students than quota control. In addition, NITRAS reported the various categories of attendees in all cases, whereas these data were not reported as available at all quota controls. No explanation for these differences could be determined.

Team training, in operational fire fighting courses, is critical in terms of the number of teams trained rather than in the number of individuals trained. NITRAS reports the individuals trained, not the number of teams. Since team size varies significantly, and since some schools make up teams on the spot from attendess from more than one activity for training, it is not possible to determine the number of operational teams trained. An additional factor which makes the NITRAS data suspect is that some quota controls reported that training records were maintained only for teams. How, or who converted these data to numbers of individuals trained was not determined.

No quota control exhibited a thorough understanding of, or knew of a use for, NITPAS. They reported that they had received no feedback reports; therefore, there was no verification of the data. An effect of this is that schools and their parent commands view the required reports to NITRAS as another routine administrative report, rather than a record which can be used in the collection of reimbursable expenditures from other commands and agencies.

INSTRUCTOR OPINIONS. Additional management insights were obtained from subjective opinions of instructors. At each school visited a group of senior instructors were interviewed to gather their perceptions of fire fighting training. It was intended to restrict these discussions to the school aspects of training, but it became immediately obvious that this was not possible. Since all instructors came to the school from operational units and were associated with damage control aboard ship, they brought a wealth of experience to the school derived from their sea duty experience. The interrelationship between the school and the ship, the informal feedback received from friends still assigned to ships, and the understanding that instructors had of the importance of fire fighting led them to volunteer some additional, vital issues. A resumé of these opinions follows.

TABLE A-6. SYSTEM/EQUIPMENT MAINTENANCE CONDITION SCORES

SYSTEM/EQUIPMENT CLASSIFICATION	SHIP		
	AD-1	AD-2	LPD-43
FP-180 Pump	17	44	40
P-250 Pump	16	18	16
Submersible Pump	44	18	41

Application of the above formula in converting the maintenance condition description of table A-4 to the maintenance condition scores in table A-6 is illustrated with the FP-180 pump. For the AD-1 the criticality classification is A (MAJOR); therefore, the maximum possible score (from table A-5) is 21. There are two deficiency types and no deficiency causes indicated; therefore, the maintenance condition score is:

$$MCS = 21 - 2(2) - 0 = 17.$$

In the case of the AD-2, NO deficiencies were indicated in table A-4, and it is therefore assigned a maintenance condition score of 44 (table A-5). Similarly, LPD-43 FP-180 pumps were assigned a criticality classification of MINOR (B), with one deficiency type (1) and one deficiency cause (h). The maintenance condition score for the LPD-43 is:

$$MCS = 43-2(1) -1 = 40.$$

STEP 3. Mathematical Analysis. Each system/equipment was treated independently in analyzing specific system/equipment and ship training needs. No attempt was made to devise a sophisticated weighting system based on the criticality of one system over another. Such sophistication was not necessary to meet the objectives of this study. It was necessary, however, to derive from the individual scores, as illustrated in table A-6, an overall maintenance condition rating for each system/equipment classification and an overall F/F capability rating for each ship based on the overall maintenance condition of all systems onboard the ship. Two rating factors were established for this purpose. The definition and the formula for each factor is:

1. Effectiveness Ratio (ER) -- The ratio of the mean of the Maintenance Condition Scores (MCSs) for a specific system to the Maximum Maintenance Condition Score possible (44). This ratio indicates on a scale of 0 to 1.0 the relative maintenance condition of an individual fire fighting equipment/system.

$$ER = \frac{\Sigma MCS_e/N_e}{44}$$

where MCS_e = Maintenance Condition Score for a specific equipment classification

N_e = Equipment classification sample size.

2. Operational Readiness Factor (ORF) -- The ratio of the mean of the MCSs for all systems onboard a specific ship to the maximum Maintenance Condition Score possible. This ratio indicates on a scale of 0 to 1.0 the overall capability of a ship to combat a fire situation based on the maintenance condition of all of the F/F systems/equipments onboard.

$$ORF = \frac{\Sigma MCS_s/N_s}{44}$$

where MCS_s = Maintenance Condition Score for each equipment classification onboard a specific ship

N_s = Number of different equipment classifications onboard a specific ship.

To illustrate the application of the above two formulas, the data presented in table A-6 were used to calculate the ERs and ORFs for the respective systems and ships. Results of these calculations are listed in table A-7. The specific steps involved in the calculation of each rating factor are illustrated by calculating the ER for the FP-180 and the ORF for ship AD-1.

TABLE A-7. CALCULATED ERs AND ORFs

ER			ORF		
SYSTEM/EQUIPMENT CLASSIFICATION			SHIP		
FP-180	P-250	Submersible Pump	AD-1	AD-2	LPD-43
.765	.379	.780	.583	.606	.735

Calculation of the ER for the FP-180 requires summing the MCSs listed in the horizontal column of table A-6, dividing this sum by the equipment sample size (N_e) of 3, and dividing this result by 44. Mathematically expressed:

$$ER = \frac{\frac{17 + 44 + 40}{3}}{44}$$

$$ER = \underline{.765}$$

The ORF for ship AD-1 is calculated in similar fashion to the ER, the basic difference being that the MCSs in table A-6 are summed vertically and divided by the different equipment classifications (N_S) onboard the AD-1. In this case N_S is 3. Mathematically expressed:

$$ORF = \frac{\frac{17 + 16 + 44}{3}}{44}$$

$$ORF = \underline{.583}$$

The final step in the mathematical analysis was to determine which of the maintenance deficiency types and deficiency causes (refer to table A-3) occurred most frequently for (1) a specific F/F equipment classification, (2) all F/F equipment classifications, and (3) all F/F systems aboard a ship. This determination was made using a straight percentage procedure. For example, using the data in table A-4 for a specific equipment classification, the P-250 pump, it can be seen that of the five deficiency types listed, 40 percent (2 of 5) are attributed to Type 1, 20 percent (1 of 5) to Type 2, 20 percent (1 of 5) to Type 5, and 20 percent (1 of 5) to Type 6. Similarly, using the same data to examine deficiency causes (three are listed: e, i, and a), it is apparent that 33.3 percent of all causes are due to deficiency cause a, 33.3 percent to cause e and 33.3 percent to cause i. Percentages based on all F/F equipment classifications and all F/F equipment aboard a ship were computed in the same way. These percentage calculations were used to isolate potential inadequacies in F/F equipment maintenance training.

STEP 4. Rating System. To permit meaningful interpretation of the data calculations described in step 3, it was necessary to devise a procedure for rating (1) each specific equipment classification and (2) overall F/F capability of each ship based on their calculated ER and ORF. The five ratings with their corresponding ER and ORF numerical range are shown in table A-8. The same rating system was used in rating both the systems/equipments and the ships. This system provided a straightforward procedure for comparing individual system/equipment ERs to assist in determining training requirements. Individual ship ORFs can be used to determine which vessels require additional training. Such a rating system was not necessary for examination of maintenance deficiency types and causes.

TABLE A-8. FIRE FIGHTING EQUIPMENT AND SHIP CAPABILITY RATING SYSTEM

ER & ORF NUMERICAL RANGE	RATING
.950 to 1.000	Outstanding
.900 to .949	Good
.850 to .899	Acceptable
.800 to .849	Marginal
.000 to .799	Unsafe

STEP 5. Data Computation. All F/F system/equipment classifications examined were rank ordered based on the calculated ER for each system/equipment classification. Rank ordering by the calculated ORF for each individual ship examined was not appropriate. All deficiency types and all deficiency causes were separately rank ordered. In both cases, the rank ordering was performed on the basis of a percentage of a specific deficiency type/cause to the total number of deficiency types/causes for all equipment classifications.

DATA SUMMARY

The F/F equipment maintenance data reduced from the 55 INSURV reports are summarized in this appendix, tables A-9 through A-18. In the interest of brevity, the initial maintenance condition description data recorded under step 1 has been omitted; however, these data are on file in TAEG.

Maintenance condition scores were calculated for all system/equipment classifications using the procedures described under step 2. These scores are presented in table A-9. Using the maintenance condition scores in table A-9 and the procedure discussed under step 3, ERs were calculated for all system/equipment classifications, and ORFs were calculated for all ships.

The ERs are presented in table A-10, and ORFs are presented in table A-11.

Table A-12 lists the system/equipment rating and relative rank as determined by the procedures established by steps 4 and 5 described in the analysis.

Table A-13 indicates the F/F operational readiness of the ships examined as determined by the rating procedure of step 4. Tables A-9 through A-13 present data indicating the overall maintenance condition of specific F/F systems/equipments and the overall F/F readiness of specific ships based on the maintenance condition of these systems/equipments.

Tables A-14 through A-18 identify, based on frequency of occurrence, the major types of maintenance deficiencies and the causes of these deficiencies for (1) each system/equipment classification and (2) F/F system/equipment as a group classification. All numerical figures are expressed in percentages as described under step 3, Mathematical Analysis. Table A-14 presents a detailed breakdown of the frequency of occurrence of each of the three criticality classifications for each system/equipment examined. Those systems/equipments with a high percentage figure in the Major Criticality Classification column potentially have deficient areas in their maintenance training programs. An indication of these training deficient areas is provided by the data presented in table A-15.

Table A-15 presents, for each system/equipment, the frequency of occurrence of each of the six major types of deficiencies. Using the P-250 for illustration, deficiency type (1), lack of maintenance, occurs most frequently (46.5 percent of the time).

TABLE A-9. SYSTEM/EQUIPMENT MAINTENANCE CONDITION SCORES

	SYSTEM/EQUIPMENT CLASSIFICATION	MAINTENANCE CONDITION SCORE BY SHIP									
		AD-1	AD-2	AE-3	AE-4	AE-5	AFS-6	AO-7	AO-8	AOE-9	AOE-10
1.	FP-180 Pump(s)	17	44	44	41	44	17	17	19	38	17
2.	P-250 Pump(s)	16	18	17	18	13	16	14	17	16	17
3.	Submersible Pump(s)	44	18	41	44	44	44	44	40	44	44
4.	Firepump(s)	44	44	44	44	44	44	44	44	44	19
5.	Firemain	16	41	39	39	39	41	41	37	39	38
6.	Fog Foam System	NA	NA	NA	NA	NA	NA	40	44	16	35
7.	CO_2 Smothering System	38	38	44	40	17	44	37	37	39	36
8.	CO_2 Portable System(s)	44	44	44	44	44	40	44	41	44	40
9.	Twin Agent System	16	13	37	44	39	17	15	13	15	44
10.	PKP Portable System	42	44	44	44	44	41	44	41	19	19
11.	Water Curtain(s)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
12.	Countermeasures System	44	44	18	44	19	40	16	16	41	40
13.	Magazine Sprinkler System	44	44	10	44	12	34	39	44	37	44
14.	Flame Arrestors	19	44	18	18	18	18	38	41	18	44
15.	Flash Screens	44	44	19	18	19	44	44	44	19	44
16.	Audible & Visual Alarms	19	17	44	19	17	38	17	44	41	19
17.	OBA(s)	38	40	16	17	18	44	38	38	40	41
18.	OBA Training Kits	41	44	44	19	44	19	40	44	44	44
19.	Survival Support Devices	44	39	44	19	44	19	40	17	40	44
20.	Portable Blowers	44	44	44	44	44	39	39	44	44	39
21.	Compartment Checkoff/DC Plates	41	44	41	41	41	44	41	41	44	44

TABLE 4-9. SYSTEM/EQUIPMENT MAINTENANCE CONDITION SCORES (continued)

SYSTEM/EQUIPMENT	MAINTENANCE CONDITION SCORE BY SHIP									
	ARS-12	AOR-13	AR-13	ARS-14	ARS-15	ARS-16	ARS-17	ARS-18	ARS-19	AS-20
[illegible]	39	19	44	44	44	16	17	17	44	44
[illegible]	14	41	16	16	40	39	38	41	15	17
[illegible]	44	41	44	44	44	44	44	41	44	44
[illegible]	44	19	41	44	44	44	40	44	44	44
[illegible]	41	38	40	16	40	19	17	39	39	38
[illegible] System	17	44	NA	NA	NA	NA	NA	NA	NA	40
[illegible] Smothering System	39	41	44	16	13	18	17	41	44	39
CO_2 Portable System(s)	44	39	44	16	44	44	44	40	40	39
Twin Agent System	15	19	16	40	17	17	44	41	44	44
[illegible] Portable System	44	41	44	40	44	44	19	44	44	44
[illegible]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
[illegible] Measure System	19	40	18	19	44	18	44	44	17	17
[illegible] Sprinkler System	44	44	39	44	44	41	41	44	40	39
[illegible] Arrestors	40	19	44	44	44	44	19	44	44	18
[illegible] Screens	44	44	44	44	44	44	44	17	41	44
Audible & Visual Alarms	36	41	17	19	44	19	40	44	44	40
[illegible]	40	40	40	40	39	39	40	40	39	40
[illegible] Training Kits	44	19	44	44	44	44	40	44	19	44
[illegible] Survival Support Devices	44	19	44	41	18	18	40	18	44	39
Portable Blowers	44	44	44	44	44	44	19	44	44	44
Compartment Checkoff/DC Plates	44	41	44	41	41	41	41	44	40	44

	[illegible]	44	[illegible]	43	[illegible]	[illegible]	[illegible]	44	[illegible]	19	41
	[illegible]	17	18	15	17	[illegible]	19	44	38	39	37
3.	Sprinkler Isolation Valve(s)	17	40	40	44	44	44	44	44	44	44
4.	Firepump(s)	44	44	44	44	41	17	44	44	44	44
5.	Firemain	44	38	40	44	39	44	40	39	38	43
6.	Fog Foam System	44	35	44	44	44	44	44	44	44	44
7.	CO_2 Smothering System	38	36	39	39	40	38	38	39	36	40
8.	CO_2 Portable System(s)	40	39	41	38	41	40	44	41	44	39
9.	Twin Agent System	14	44	37	14	14	39	39	39	12	14
10.	PKP Portable System	44	40	41	44	40	44	44	44	44	41
11.	Water Curtain(s)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
12.	Countermeasures System	44	17	16	38	44	19	41	17	16	41
13.	Magazine Sprinkler System	33	35	39	41	44	36	44	40	44	37
14.	Flame Arrestors	18	18	40	44	44	16	44	18	44	19
15.	Flash Screens	41	44	44	44	44	44	44	44	44	17
16.	Audible & Visual Alarms	17	19	44	40	38	17	44	41	17	44
17.	OBA(s)	40	40	41	40	44	44	40	38	39	40
18.	OBA Training Kits	44	44	44	19	44	19	44	19	40	19
19.	Survival Support Devices	44	44	44	19	17	41	44	19	19	40
20.	Portable Blowers	44	44	44	39	44	41	44	44	44	39
21.	Compartment Checkoff/DC Plates	41	41	41	44	41	44	44	41	44	44

TABLE [illegible]. SYSTEM EQUIPMENT MAINTENANCE CONDITION SCORES (Continued)

NO.	EMALSIPMENT CLASSIFICATION	MAINTENANCE CONDITION SCORE BY SHIP									
		DD-31	DD-32	DDG-33	DDG-34	DDG-35	DDG-36	DDG-37	FF-38	FF-39	[illegible] 40
1.	[illegible]-150 Pump(s)	41	44	17	19	16	39	44	44	44	19
2.	P-250 Pump(s)	41	41	14	18	17	17	40	17	17	18
3.	Submersible Pump(s)	44	44	40	44	44	19	39	41	44	17
4.	Firepump(s)	44	44	44	44	44	44	44	44	44	44
5.	Firemain	39	40	40	44	39	44	40	41	44	44
6.	Fog Foam System	44	44	44	44	44	44	44	44	44	44
7.	CO_2 Smothering System	37	39	40	39	40	41	39	40	40	39
8.	CO_2 Portable System(s)	40	44	41	44	44	44	38	44	44	40
9.	Twin Agent System	38	39	36	40	39	35	39	15	36	18
10.	PKP Portable System	40	44	44	44	44	44	40	44	40	44
11.	Water Curtain(s)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
12.	Countermeasures System	40	16	19	15	40	14	17	40	14	17
13.	Magazine Sprinkler System	44	44	37	44	41	38	44	40	37	44
14.	Flame Arrestors	18	44	44	44	44	44	40	18	40	41
15.	Flash Screens	44	19	44	44	44	41	44	41	44	44
16.	Audible & Visual Alarms	44	44	41	37	41	44	44	17	41	39
17.	OBA(s)	19	40	40	40	40	40	44	39	40	40
18.	OBA Training Kits	44	44	44	19	19	44	44	44	44	44
19.	Survival Support Devices	19	19	44	40	41	17	44	41	15	19
20.	Portable Blowers	39	44	39	39	44	44	44	44	44	44
21.	Compartment Checkoff/DC Plates	41	41	44	44	41	41	41	44	41	44

[illegible]	[illegible]	[illegible]	16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	44	[illegible]	41	[illegible]	[illegible]	[illegible]	14	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	44	[illegible]	[illegible]	44	[illegible]	[illegible]	[illegible]
[illegible]	36	40	41	[illegible]	[illegible]	40	15	34	[illegible]	[illegible]
Fog Foam System	[illegible]	44	44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CO_2 Smothering System	41	39	38	37	44	40	44	17	38	14
CO_2 Portable System(s)	44	39	44	37	44	44	39	44	43	44
9. Twin Agent System	17	10	37	44	13	14	39	16	16	12
10. PKP Portable System	41	41	44	44	44	44	40	41	39	19
11. Water Curtain(s)	NA	19	44	44	19	19	37	NA	NA	44
12. Countermeasures System	14	44	18	44	17	19	15	18	18	44
13. Magazine Sprinkler System	44	39	41	38	35	12	44	16	44	38
14. Flame Arrestors	39	[illegible]	18	40	40	44	44	19	40	18
15. Flash Screens	44	19	44	44	44	44	44	44	44	44
16. Audible & Visual Alarms	44	41	39	44	17	17	44	13	41	16
17. OBA(s)	40	40	40	40	38	40	44	39	44	38
18. OBA Training Kits	44	19	44	44	44	44	44	40	44	44
19. Survival Support Devices	19	44	19	44	44	19	19	40	19	17
20. Portable Blowers	41	19	44	44	44	40	44	40	44	44
21. Compartment Checkoff/ Plates	44	41	44	41	41	41	40	41	41	41

[illegible] MAINTENANCE CONDITION SCORE (continued)

[illegible]	MAINTENANCE CONDITION SCORE BY SHIP				
	[illegible]	LST-5	[illegible]	[illegible]	MSO-55
[illegible]	[illegible]	19	[illegible]	[illegible]	44
[illegible]	[illegible]	41	[illegible]	[illegible]	17
[illegible]	[illegible]	19	[illegible]	[illegible]	NA
[illegible]	[illegible]	44	[illegible]	[illegible]	44
5.	[illegible]	40	36	39	41
6.	Fog Foam System	15	44	NA	NA
7.	CO_2 Smothering [illegible]	41	40	44	40
8.	CO_2 Portable System(s)	38	40	44	44
9.	Twin Agent System	16	11	19	39
10.	[illegible] Portable System	39	44	44	44
11.	Water Curtain(s)	44	41	NA	NA
12.	Countermeasures System	39	40	NA	NA
13.	Magazine Sprinkler System	44	44	44	44
14.	Flame Arrestors	36	40	44	19
15.	Flash Screens	44	44	44	44
16.	Audible & Visual Alarms	40	41	44	19
17.	OBA(s)	40	40	44	44
18.	OBA Training Kits	44	44	44	44
19.	Survival Support Devices	16	44	19	17
20.	Portable Blowers	44	39	44	44
21.	Compartment Checkoff/ID Plates	41	44	44	41

TABLE A-10. SYSTEM/EQUIPMENT EFFECTIVENESS RATIO (ER)

	SYSTEM/EQUIPMENT CLASSIFICATION	Ne	$\leq$ MCSe	ER
1.	FP-180 Pump	55	1,677	.693
2.	P-250 Pump	55	1,367	.565
3.	Submersible Pump	53	1,975	.847
4.	Firepump	55	2,303	.952
5.	Firemain	55	2,063	.852
6.	Fog Foam System	40	1,501	.853
7.	CO_2 Smothering System	55	2,015	.833
8.	CO_2 Portable System	55	2,285	.944
9.	Twin Agent System	55	1,487	.614
10.	PKP Portable System	55	2,248	.929
11.	Water Curtain	10	351	.798
12.	Countermeasures System	53	1,478	.634
13.	Magazine Sprinkler System	55	2,150	.888
14.	Flame Arrestors	55	1,795	.742
15.	Flash Screens	55	2,178	.900
16.	Audible & Visual Alarms	55	1,811	.748
17.	OBA(S)	55	2,126	.879
18.	OBA Training Kit	55	2,100	.868
19.	Survival Support Devices	55	1,704	.704
20.	Portable Blowers	55	2,307	.953
21.	Compartment Checkoff/DC Plates	55	2,316	.957

TABLE A-11. SHIP OPERATIONAL READINESS FACTOR (ORF)

	SHIP	Ns	≤MCSs	ORF
1.	AD-1	19	655	.783
2.	AD-2	19	708	.847
3.	AE-3	19	652	.780
4.	AE-4	19	641	.767
5.	AE-5	19	604	.722
6.	AFS-6	19	643	.769
7.	AO-7	20	692	.786
8.	AO-8	20	706	.802
9.	AOE-9	20	682	.775
10.	AOE-10	20	712	.809
11.	AOR-11	20	740	.841
12.	AOR-12	20	696	.791
13.	AR-13	19	711	.850
14.	ARS-14	19	656	.785
15.	ARS-15	19	736	.880
16.	ARS-16	19	637	.762
17.	ARS-17	19	648	.775
18.	ARS-18	19	731	.874
19.	ARS-19	19	730	.873
20.	AS-20	20	762	.866
21.	AS-21	20	712	.809
22.	AS-22	20	695	.790
23.	CG-23	20	781	.888
24.	CG-24	20	715	.813
25.	CG-25	20	782	.889
26.	CGN-26	20	664	.755
27.	CGN-27	20	858	.975
28.	DD-28	20	712	.809

TABLE A-11. SHIP OPERATIONAL READINESS FACTOR (ORF) (continued)

	SnIP	Ns	≤MCSs	ORF
29.	DD-29	20	715	.813
30.	DD-30	20	724	.823
31.	DD-31	20	763	.867
32.	DD-32	20	778	.884
33.	DDG-33	20	756	.859
34.	DDG-34	20	746	.848
35.	DDG-35	20	766	.870
36.	DDG-36	20	738	.839
37.	DDG-37	20	813	.924
38.	FF-38	20	742	.843
39.	FF-39	20	758	.861
40.	FF-40	20	697	.792
41.	FFG-41	20	744	.845
42.	LPD-42	21	673	.728
43.	LPD-43	21	781	.845
44.	LPD-44	21	801	.867
45.	LPH-45	21	715	.774
46.	LPH-46	21	634	.686
47.	LPH-47	21	781	.845
48.	LSD-48	20	611	.694
49.	LSD-49	20	742	.843
50.	LST-50	21	676	.732
51.	LST-51	21	582	.630
52.	LST-52	21	744	.805
53.	LST-53	21	801	.867
54.	MSO-54	17	666	.890
55.	MSO-55	17	629	.841

TABLE A-12. SYSTEM/EQUIPMENT RATING AND RANK ORDER

OUTSTANDING	GOOD	ACCEPTABLE	MARGINAL	UNSAFE
1. Compartment Checkoff/DC Plates	4. CO_2 Portable System	7. Magazine Sprinkler System	12. Submersible Pumps	14. Water Curtain
2. Firepumps	5. PKP Portable System	8. OBA(s)		15. Audible & Visual Alarms
3. Portable Blowers	6. Flash Screens	9. OBA Training Kits	13. CO_2 Smothering System	16. Flame Arrestors
		10. Fog Foam System		17. Survival Support Devices
		11. Firemain		18. FP-180 Pump
				19. Countermeasures System
				20. Twin Agent System
				21. P-250 Pump

TABLE B-6. COURSE J-495-0426,
RESERVE AIRCRAFT FIRE FIGHTING
(PERIOD 1 JANUARY 1979 to 1 JULY 1979)

COURSE DATA	COURSE LOCATIONS						
	FTC NORFOLK	FTC MAYPORT	FTC SAN DIEGO	FMWTC CHARLES-TON	NTTC TREASURE ISLAND	NDLTC PHILADEL-PHIA	NTC GREAT LAKES
[illegible] DATA	0	36	48	12	0	0	0
[illegible] DATA	60	60	108	30	75	0	0
[illegible] COURSES	2	0	2	2	6	6	0
[illegible] DATA AVAILABLE	120	0	216	60	450	0	0
[illegible]	60	0	144	0	450	0	0
[illegible]	30	0	128	0	478	110	1,323
[illegible]	100	0	67%	0	100%	0	0
[illegible] DATA FILLED	50	0	59%	0	106%	0	0
[illegible] DATA FILLED	50	0	89%	0	106%	0	0
[illegible]	30	0	16	0	0	0	0
[illegible]	50	0	11%	0	0	0	0
[illegible] (PLATFORM) (% OF TOTAL)							
	0	0	0	0	0	0	0
	0	0	0	0	476(100%)	110(100%)	350(26%)
	0	0	0	0	0	0	0
	0	0	0	0	0	0	123(9%)
	0	0	0	0	2 (1%)	0	850(64%)
[illegible] ASSIGNED IN USN	NA	NA	NA	NA	NA	NA	NA
[illegible] TRAINED	30	0	128	0	478	110	1,323
[illegible] (WITH STANDBYS)	50	0	59%	0	127%	0	0
[illegible] (WITHOUT STANDBYS)	NA	NA	NA	NA	NA	NA	NA
[illegible] TRAINING	0	0	0	0	435	0	0

ABLE [illegible] (CODE [illegible] 486-041A)
SHIPBOARD FIRE FIGHTING TEAM TRAINING
(PERIOD 1 JANUARY 1979 to 1 JULY 1979

	COURSE LOCATIONS					
[illegible] DATA	FTC NORFOLK	FTC MAYPORT	FTC SAN DIEGO	FMWTC CHARLES-TON	NTTC TREASURE ISLAND	NDCTC PHILADEL-PHIA
[illegible]	1 TEAM (12/TEAM)	1 TEAM (18/TEAM)	1 TEAM (14/TEAM)	1 TEAM (12/TEAM)	1 TEAM (15/TEAM)	0
MAXIMUM [illegible]	1 TEAM (24/TEAM)	1 TEAM (24/TEAM)	3 TEAM (20/TEAM)	1 TEAM (24/TEAM)	4 TEAM (30/TEAM)	0
MAXIMUM [illegible]	96	50	25	46	13	0
MAXIMUM [illegible] AVAILABLE	2,400	1,200	1,500	1,104	1,560	0
[illegible]	2,400	0	1,260	549	554	0
[illegible]	1,138	835	860	480	376	0
AVAILABLE QUOTAS REQUESTED	100%	0	84	50%	36%	0
AVAILABLE QUOTAS FILLED	47%	70%	57%	43%	24%	0
REQUESTED QUOTAS FILLED	47%	0	68%	87%	68%	0
[illegible] NO-SHOWS	1,262	0	600	69	178	0
[illegible] NO-SHOWS	53%	0	48%	13%	32%	0
[illegible] ATION (NO. & % OF TOTA						
[illegible]	0	1,200(87%)	760(91%)	480(100%)	346(92%)	0
[illegible]	1	0 (5%)	60(7%)	0	16(4%)	0
[illegible]	0	0	20(2%)	0	0	0
[illegible] NFS	0	0	0	0	0	0
[illegible]	0	0 (2%)	0	0	14(4%)	0
[illegible] (CODE 3) BSN	NA	NA	20(2%)	NA	NA	
[illegible] NAVAL	1,138	835	860	480	376	0
[illegible] WITH [illegible]	61%	0	65%	69%	91%	0
[illegible] WITHOUT [illegible]	NA	NA	50%	NA	NA	NA
[illegible] EMPLOY [illegible]				1	30	

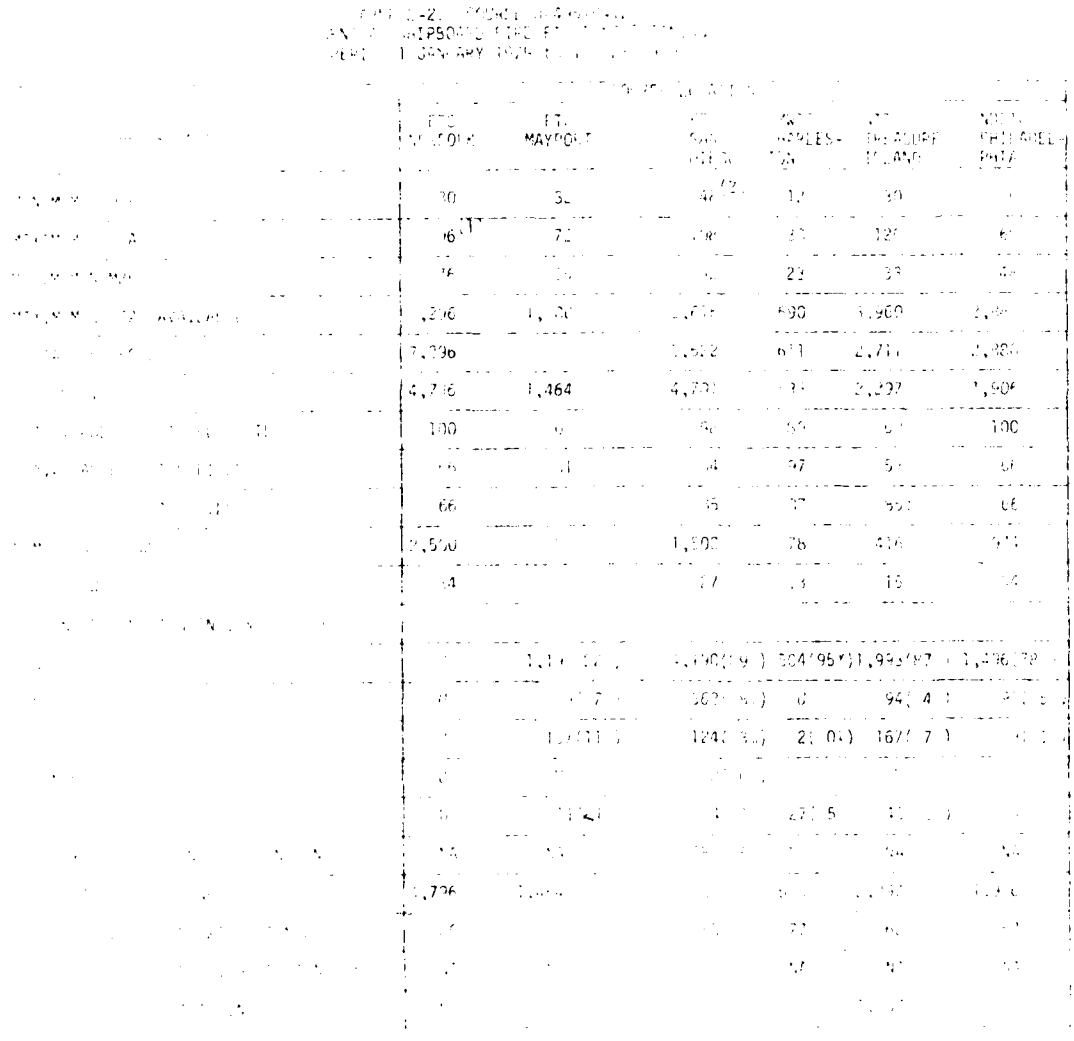
TABLE B-4. COURSE J-495-0414,
AVIATION FACILITY SHIP HELICOPTER
FIRE FIGHTING TEAM TRAINING
(PERIOD 1 JANUARY 1979 to 1 JULY 1979)

	COURSE LOCATIONS				
[illegible]	FTC NORFOLK(1)(2)	FTC MAYPORT(2)	FTC SAN DIEGO(2)	FMWTC CHARLES-TON(2)	NTTC TREASURE ISLAND(2)
[illegible]	1 TEAM (17/TEAM)	1 TEAM (18/TEAM)	1 TEAM (17/TEAM)	1 TEAM (14/TEAM)	2 TEAM (15/TEAM)
[illegible]	3 TEAM (29/TEAM)	1 TEAM (24/TEAM)	3 TEAM (24/TEAM)	1 TEAM (16/TEAM)	4 TEAM (20/TEAM)
[illegible]	24	25	25	23	13
[illegible]	2,088	600	1,500	368	1,560
[illegible]	2,088	U	1,320	228	922
[illegible]	815	353	1,120	197	707
[illegible]	100	U	88%	62%	59%
[illegible]	39	59%	75%	54%	45%
[illegible]	39%	U	85%	86%	77%
[illegible]	1,273	U	240	31	215
[illegible]	61	U	18%	14%	23%
[illegible]					
	U	233(80%)	1,040(93%)	174(88%)	640(91%)
	U	35(10%)	40(4%)	0	18(3%)
	U	15(4%)	40(4%)	0	49(7%)
	U	0	0	0	0
	U	20(6%)	0	23(12%)	0
[illegible]	NA	NA	100(9%)	NA	NA
[illegible]	815	353	1,120	197	707
[illegible]	43	88	85%	102%	42%
[illegible]	NA	NA	71%	NA	NA
[illegible]	U	U	U	U	29

[illegible] ... average of three teams, one course per week
[illegible] ... personnel per team

TABLE B-3. COURSE J-495-0413,
SHIPBOARD AIRCRAFT FIRE FIGHTING TRAINING
(PERIOD 1 JANUARY 1979 to 1 JULY 1979)

C DATA	COURSE LOCATIONS		
	FTC NORFOLK	FTC MAYPORT	FTC SAN DIEGO
	37	36	48
	60	60	72
	50	25	50
AVAILABLE	3,000	1,500	3,600
	3,000	U	3,569
	2,013	1,256	3,193
	100%	U	99%
(% FILLED)	67%	84%	89%
	67%	U	89%
	987	U	807
	33%	U	23%
N (NO. & % OF TOTAL)			
		1,194(95%)	2,538(79%)
		61(5%)	205(6%)
		0	16(1%)
		0	428(14%)
		1(<1%)	6(<1%)
	33	NA	431(13%)
	2,013	1,256	2,193
	72	84	85
	NA	NA	64
	0	0	0



5.	[illegible]-0420		0	128	913	0	112	Not Taught	1,32[illegible]
6.	Sub-Total (1-5)	9,792	3,908	10,002	5,509	1,210	2,016	0	1,32[illegible]
7.	[illegible]-2933	174	46	156	59	63	112	Not Taught	Not Taught
8.	[illegible]-0950	98	Not Taught	99	Not Taught	Not Taught	Not Taught	Not Taught	Not Taught
9.	[illegible]-0423	Not Taught	Not Taught	Not Taught	Not Taught	163	Not Taught	Not Taught	Not Taught
10.	[illegible]-8881	81	Not Taught	Not Taught	Not Taught	Not Taught	Not Taught	Not Taught	Not Taught
11.	[illegible]-0400	574	303	797	164	44	Not Taught	Not Taught	Not Taught
12.	Sub-Total (7-11)	803	349	1,042	223	270	112	0	0
13.	Navy Recruit	Not Taught	Not Taught	21,120	Not Taught	Not Taught	Not Taught	21,120	10,560
14.	Coast Guard Recruit	Not Taught	Not Taught	Not Taught	790	Not Taught	Not Taught	Not Taught	Not Taught
15.	Total (6+12+13+14)	9,595	4,257	32,164	6,522	1,480	2,128	21,120	11,883

NOTE: Numbers are the total of attendees at each course as reported by quota control and/or the school.

Item 3, Maximum Number Courses--The maximum number of courses which could have been conducted was determined by multiplying the course frequency by the survey period (in weeks or months as applicable) and subtracting for facility downtime.

Item 4, Maximum Quotas Available--This was determined by multiplying the maximum quota (Item 2) by the maximum number of courses available (Item 3) for the survey period.

Item 10, Number No-Shows--The number of no-shows was determined by subtracting quotas filled (Item 6) from quotas requested (Item 5).

Item 11, Percent No-Shows--The ratio of no-shows (Item 10) to the quotas requested (Item 5).

Item 12, Student Population--Two sets of figures are given for each category of student. They are (1) total number of students and (2) the percentage of the number of students to the total students trained (Item 13). Standby students, a distinction which applies only to San Diego, are included in the USN total.

In some instances the USNR, USMC, and other categories of students were not separately recorded even though some of these students may have been in attendance. These were recorded with the USN category of students. Therefore, the total students trained (Item 13) is correct, but the student categories may be in error.

Item 14, Course Utilization (with standbys)--This calculation is made for all courses at all locations. Course utilization was calculated as the ratio of total students trained (Item 13) to the maximum quota (Item 4) for all courses actually conducted. In some cases courses were cancelled for unknown reasons. In these instances the maximum quota for the courses actually conducted was less than the projected maximum quotas available (Item 4).

Item 15, Course Utilization (without standby)--This statistic applies only to courses conducted at San Diego; its purpose is to demonstrate the impact of standby students on course utilization. The statistic was calculated in the same manner as Item 14 except that standby students were not included.

APPENDIX B

A SURVEY OF FIRE FIGHTING AND RELATED TRAINING CONDUCTED BY THE U.S. NAVY

A survey of training commands (within the continental United States) charged with providing fire fighting (F/F) and/or F/F related training was conducted through on-site visits to each command. The survey included operational F/F training, recruit F/F training, F/F equipment maintenance training, and DCPO training.

Data for each training course (i.e., number of students processed, quotas issued, course frequency, etc.) were obtained from the quota control office and/or school as appropriate. Unreported training data, that is, training not reported to quota control, were obtained, where available, directly from individual school records. In some instances, such as course J-495-0426 at Mayport and course J-495-0418 at Philadelphia, no records could be located to indicate the number of students processed. These instances are noted as unknown (U) in the subsequent tables. The survey included all training provided during the period 1 January 1979 to 1 July 1979.

Table B-1 provides, by course and by course location, a summary of all training data that could be identified. These data represent the total number of students processed during the 6-month survey period. Attention is directed to the difference between the number of recruits processed at Great Lakes (10,560) and the number processed at the other two Navy recruit training centers (21,120 each). This difference is due to the fact that the Great Lakes F/F facility was not in operation (due to weather) for 3 months of the 6-month survey period.

Table B-1 is a summary of the student population data presented in tables B-2 through B-12. In addition to student population data, tables B-2 through B-11 provide detailed statistics relative to utilization and no-show rates, student population source, and quotas, organized by activity and individual course. Calculations for these tables were simple and varied slightly dependent upon the form in which the data were presented. In the case of the two team training courses, J-495-0414 and J-495-0418, data were sometimes given in the form of total personnel trained and sometimes in the form of total teams trained. For consistency, all calculations were made on the basis of total personnel processed, not teams processed. To determine the maximum quota for a team course when the data were expressed in team form, the maximum number of personnel on a team was multiplied by the maximum number of teams per course.

Table B-12 includes only numbers of persons attending recruit training at the various commands. Utilization data, source data, and no-show data are not applicable and therefore not included in this table.

A brief description of the calculations required in developing tables B-2 through B-11 is provided below. Where calculations were dependent upon a data item which contained an unknown quantity, that calculation was not performed.

TABLE A-18. DEFICIENCY CAUSE FREQUENCY (ALL SYSTEMS/EQUIPMENTS)

Deficiency Cause									
(a)	(b) %	(c) %	(d) %	(e) %	(f) %	(g) %	(h) %	(i) %	TOTAL*
34.0	8.2	4.0	14.8	7.8	0.2	1.3	16.2	13.5	474

*Indicates the total number of all deficiency causes for all systems/ equipments.

TABLE A-17. DEFICIENCY CAUSE FREQUENCY (INCIDENT AS % OF SYSTEM/EQUIPMENT)

	SYSTEM/EQUIPMENT CLASSIFICATION	DEFICIENCY CAUSE									
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	Total*
1.	FP-180 Pump(s)	37.5	0	0	12.5	12.5	0	0	25.0	12.5	8
2.	P-250 Pump(s)	59.5	2.7	2.7	0	13.5	0	0	2.7	18.9	37
3.	Submersible Pump(s)	28.6	14.3	0	0	57.1	0	0	0	0	7
4.	Firepump(s)	100.0	0	0	0	0	0	0	0	0	1
5.	Firemain	61.7	6.4	0	0	2.1	2.1	0	27.7	0	47
6.	Fog Foam System	35.3	11.8	5.9	5.9	11.8	0	0	23.5	5.9	17
7.	CO_2 Smothering System	34.0	12.0	12.0	0	10.0	0	4.0	26.0	2.0	50
8.	CO_2 Portable System(s)	38.5	0	7.7	0	3.8	0	0	42.3	7.7	26
9.	Twin Agent System	31.0	12.1	0	25.9	0	0	5.2	19.0	6.9	58
10.	PKP Portable System	7.1	14.3	7.1	7.1	0	0	0	42.9	21.4	14
11.	Water Curtain(s)	33.3	0	33.3	0	0	0	0	33.3	0	3
12.	Countermeasures System	27.6	0	0	72.4	0	0	0	0	0	29
13.	Magazine Sprinkler System	31.6	28.9	7.9	0	5.3	0	0	26.3	0	38
14.	Flame Arrestors	3.8	0	0	96.2	0	0	0	0	0	26
15.	Flash Screens	40.0	0	0	60.0	0	0	0	0	0	5
16.	Audible & Visual Alarms	31.3	25.0	6.2	18.8	0	0	0	18.8	0	16
17.	OBA(s)	26.4	1.9	0	0	7.5	0	1.9	0	62.3	53
18.	OBA Training Kits	0	0	0	0	0	0	0	0	100.0	4
19.	Survival Support Devices	0	0	23.1	0	7.7	0	0	15.4	53.8	13
20.	Portable Blowers	45.0	0	0	0	55.0	0	0	0	0	20
21.	Compartment Checkoff/DC Plates	0	50.0	0	0	0	0	0	0	50.0	2

*Indicates total number of deficiency causes for the system/equipment.

Table A-16 describes maintenance deficiency type from the viewpoint of F/F systems/equipments as a group classification. Using this viewpoint, the most frequently occurring types of deficiencies are (1) maintenance and (2) inspection. Percentages for table A-16 are calculated on the basis of the total number (906) of deficiency types for all systems/equipments. Potential deficient areas in F/F equipment maintenance training programs are indicated by the data presented in tables A-17 and A-18.

Table A-17 indicates, for each system/equipment examined, the frequency with which each deficiency cause occurred. In the case of the P-250 pump, 59.5 percent of the time the deficiency was due to cause (a), missing parts. Interpretation of table A-17 data requires consideration of the total number of deficiency causes as well as the percentages given for each cause. Failure to consider all data could lead to erroneous conclusions. For example, in the case of the firepump, 100 percent of the deficiencies are attributable to cause (a); however, the total number of deficiencies was only one; obviously not a large enough sample from which a valid conclusion may be drawn. Still referring to the firepump, and referring to table A-14, it may be seen that 85.5 percent of the time (based on a sample of 55) this equipment had no deficiencies. By using both sets of data it may be concluded that there is no apparent maintenance training problem for this equipment.

Table A-18 presents the frequency of occurrence of each of the nine deficiency causes based on all deficiency causes for all F/F system/equipment classifications. Percentages were calculated on the basis of a total of 494 deficiency causes noted during review of the INSURV reports.

TABLE A-16. DEFICIENCY TYPE FREQUENCY (ALL SYSTEMS/EQUIPMENTS)

Deficiency Type						
(1) %	(2) %	(3) %	(4) %	(5) %	(6) %	TOTAL*
27.8	23.6	18.2	6.0	9.6	14.8	906

*Indicates the total number of all deficiency types for all systems/equipments.

TABLE A-19. DEFICIENCY TYPE FREQUENCY (INDIVIDUAL SYSTEM/EQUIPMENT)

	SYSTEM/EQUIPMENT CLASSIFICATION	DEFICIENCY TYPE (1) %	(2) %	(3) %	(4) %	(5) %	(6) %	Total*
1.	FP-180 Pump(s)	28.3	13.2	7.6	0	5.7	45.3	53
2.	P-250 Pump(s)	46.5	9.3	3.5	2.3	4.7	33.7	86
3.	Submersible Pump(s)	32.3	9.7	32.3	0	3.2	22.6	31
4.	Firepump(s)	50.0	0	10.0	10.0	0	30.0	10
5.	Firemain	49.3	26.9	16.4	3.0	4.5	0	67
6.	Fog Foam System	38.5	15.4	15.4	3.8	3.8	23.1	26
7.	CO_2 Smothering System	26.0	27.3	39.0	1.3	5.2	1.3	77
8.	CO_2 Portable System(s)	16.7	60.0	10.0	13.3	0	0	30
9.	Twin Agent System	30.5	28.6	30.5	1.0	0	9.5	105
10.	PKP Portable System	22.7	50.0	9.1	9.1	4.5	4.5	22
11.	Water Curtain(s)	42.9	14.3	0	0	0	42.9	7
12.	Countermeasures System	34.9	30.2	17.5	1.6	1.6	14.3	63
13.	Magazine Sprinkler System	36.8	28.1	28.1	1.8	0	5.3	57
14.	Flame Arrestors	15.0	52.5	10.0	2.5	10.0	10.0	40
15.	Flash Screens	38.5	15.4	0	7.7	38.5	0	13
16.	Audible & Visual Alarms	14.3	16.1	25.0	3.6	19.6	21.4	56
17.	OBA(s)	17.3	30.8	7.7	38.5	3.8	1.9	52
18.	OBA Training Kits	0	0	0	18.8	81.2	0	16
19.	Survival Support Devices	4.4	4.4	33.3	13.3	4.4	40.0	45
20.	Portable Blowers	6.7	33.3	6.7	26.7	6.7	20.0	15
21.	Compartment Checkoff/DC Plates	0	8.6	0	2.9	88.6	0	35

*Indicates total number of deficiency types for the system/equipment.

TABLE A-14. DEFICIENCY CRITICALITY CLASSIFICATION FREQUENCY (INDIVIDUAL SYSTEM/EQUIPMENT)

	SYSTEM/EQUIPMENT CLASSIFICATION	(*)	CRITICALITY CLASSIFICATION (A) MAJOR (%)	(B) MINOR (%)	(C) NONE (%)
1.	FP-180 Pump	(55)	49.1	16.4	34.5
2.	P-250 Pump	(55)	65.5	29.1	5.5
3.	Submersible Pump	(53)	22.6	22.6	54.7
4.	Firepump	(55)	7.3	7.3	85.5
5.	Firemain	(55)	10.9	76.4	12.7
6.	Fog Foam System	(40)	20.0	15.0	65.0
7.	CO_2 Smothering System	(55)	12.7	74.5	12.7
8.	CO_2 Portable System	(55)	1.8	45.6	52.7
9.	Twin Agent System	(55)	49.1	38.2	12.7
10.	PKP Portable System	(55)	7.3	36.4	56.4
11.	Water Curtain	(10)	30.0	30.0	40.0
12.	Countermeasures System	(53)	56.6	22.6	20.8
13.	Magazine Sprinkler System	(55)	7.3	45.5	47.3
14.	Flame Arrestors	(55)	40.0	24.0	36.0
15.	Flash Screens	(55)	16.4	7.3	76.4
16.	Audible & Visual Alarms	(55)	36.4	34.5	29.1
17.	OBA (S)	(55)	7.3	78.2	14.5
18.	OBA Training Kit	(55)	21.8	7.3	70.9
19.	Survival Support Devices	(55)	47.3	20.0	32.7
20.	Portable Blowers	(55)	3.6	23.6	72.7
21.	Compartment Checkoff/ DC Plates	(55)	0	69.1	30.9

(*) Indicates total number of criticality classifications for the system/equipment.

TABLE A-13. SHIP FIRE FIGHTING OPERATIONAL READINESS RATING

OUTSTANDING	GOOD	ACCEPTABLE	MARGINAL	UNSAFE
CGN-27	DDG-37	AR-13	AD-2	AD-1
		ARS-15	AO-8	AE-3
		ARS-18	AOE-10	AE-4
		ARS-19	AOR-11	AE-5
		AS-20	AS-21	AFS-6
		CG-23	CG-24	AO-7
		CG-25	DD-28	AOE-9
		DD-31	DD-29	AOR-12
		DD-32	DD-30	ARS-14
		DDG-33	DDG-34	ARS-16
		DDG-35	DDG-36	ARS-17
		FF-39	FF-38	AS-22
		LPD-44	FFG-41	CGN-26
		LST-53	LPD-43	FF-40
		MSO-54	LPH-47	LPD-42
			LSD-49	LPH-45
			LST-52	LPH-46
			MSO-55	LSD-48
				LST-50
				LST-51

TABLE B-7. COURSE [illegible]-0050,
FOAM GENERATING SYSTEMS
(PERIOD 1 JANUARY 1979 to 1 JULY 1979)

	COURSE DATA	COURSE LOCATIONS	
		FTC NORFOLK	FTC SAN DIEGO
1.	MINIMUM QUOTA	0	4
2.	MAXIMUM QUOTA	16	16
3.	MAXIMUM NUMBER COURSES	6	12
4.	MAXIMUM QUOTAS AVAILABLE	96	192
5.	QUOTAS REQUESTED	97	78
6.	QUOTAS FILLED	50	89
7.	AVAILABLE QUOTAS REQUESTED	100%	41%
8.	AVAILABLE QUOTAS FILLED	52%	46
9.	REQUESTED QUOTAS FILLED	52%	114%
10.	NUMBER NO-SHOWS	46	21
11.	NO-SHOWS	48%	27%
12.	STUDENT POPULATION (NO. & % OF TOTAL)		
[illegible]	[illegible]	0	87(98%)
[illegible]	[illegible]	2	1(1%)
[illegible]	[illegible]	0	1(1%)
[illegible]	[illegible]	0	0
[illegible]	[illegible]	0	0
[illegible]	[illegible] INCLUDED IN USN)	0A	32(36%)
[illegible]	[illegible]	50	89
[illegible]	[illegible] WITH STANDBYs)	52	46
[illegible]	[illegible] WITHOUT STANDBYs)	0A	70
[illegible]	[illegible]	0	

TABLE B-8. COURSE A-495-2037,
DAMAGE CONTROL P-250 PORTABLE EMERGENCY
PUMP OPERATION AND MAINTENANCE
(PERIOD 1 JANUARY 1979 to 1 JULY 1979)

COURSE DATA	COURSE LOCATION					
	FTC NORFOLK	FTC MAYPORT	FTC SAN DIEGO	FMWTC CHARLES-TON	NTTC TREASURE ISLAND	NDCTC PHILADEL-PHIA
MINIMUM QUOTA	U	2	4	2	2	U
MAXIMUM QUOTA	16	6	16	4	9	7
MAXIMUM NUMBER COURSES	24	6	18	23	U	26
MAXIMUM QUOTAS AVAILABLE	384	36	216	92	117	182
QUOTAS REQUESTED	384	U	201	69	79	U
QUOTAS FILLED	179	46	156	63	59	112
AVAILABLE QUOTAS REQUESTED	100%	U	93%	75%	68%	U
AVAILABLE QUOTAS FILLED	47%	127%	72%	68%	50%	62%
REQUESTED QUOTAS FILLED	47%	U	78%	91%	75%	U
NUMBER NO-SHOWS	205	U	70	6	20	U
NO-SHOWS	53%	U	35%	9%	25%	U
STUDENT POPULATION (NO. & % OF TOTAL)						
USN	U	33(72%)	147(94%)	63(100%)	43(73%)	103(92%)
USNR	U	4(9%)	1(1%)	0	1(2%)	7(6%)
USMC	U	9(20%)	8(5%)	0	15(25%)	2(2%)
USMCR	U	0	0	0	0	0
OTHER	U	0	0	0	0	0
STANDBY STUDENTS (INCLUDED IN USN)	NA	NA	25(16%)	NA	NA	NA
TOTAL STUDENTS TRAINED	179	46	156	63	59	112
COURSE UTILIZATION (WITH STANDBYS)	53%	85%	72%	88%	50%	U
COURSE UTILIZATION (WITHOUT STANDBYS)	NA	NA	56%	NA	NA	NA
TOTAL UNREPORTED TRAINING	U	U	U	U	U	U

TABLE B-9. COURSE J-495-0423,
OXYGEN BREATHING APPARATUS REQUALIFICATION
(PERIOD 1 JANUARY 1979 to 1 JULY 1979)

COURSE DATA	COURSE LOCATION
	FMWTC CHARLESTON
1. MINIMUM QUOTA	6
2. MAXIMUM QUOTA	30
3. MAXIMUM NUMBER COURSES	6
4. MAXIMUM QUOTAS AVAILABLE	180
5. QUOTAS REQUESTED	189
6. QUOTAS FILLED	163
7. % AVAILABLE QUOTAS REQUESTED	105%
8. % AVAILABLE QUOTAS FILLED	91%
9. % REQUESTED QUOTAS FILLED	86%
10. NUMBER NO-SHOWS	26
11. % NO-SHOWS	14%
12. STUDENT POPULATION (NO. & % OF TOTAL)	
12.1 USN	163(100%)
12.2 USNR	0
12.3 USCG	0
12.4 MARINES	0
12.5 OTHER	0
12.6 STANDBY STUDENTS (INCLUDED IN USN)	NA
13. TOTAL STUDENTS TRAINED	163
14. COURSE UTILIZATION (WITH STANDBYs)	109%
15. COURSE UTILIZATION (WITHOUT STANDBYs)	NA
16. TOTAL UNREPORTED TRAINING	U

TABLE B-10. COURSE X-888-8881
(PERIOD 1 JANUARY 1979 to 1 JULY 1979)

COURSE DATA	COURSE LOCATION
	FTC NORFOLK
1. MINIMUM QUOTA	15
2. MAXIMUM QUOTA	150
3. MAXIMUM NUMBER COURSES	24
4. MAXIMUM QUOTAS AVAILABLE	U
5. QUOTAS REQUESTED	U
6. QUOTAS FILLED	U
7. % AVAILABLE QUOTAS REQUESTED	U
8. % AVAILABLE QUOTAS FILLED	U
9. % REQUESTED QUOTAS FILLED	U
10. NUMBER NO-SHOWS	U
11. % NO-SHOWS	U
12. STUDENT POPULATION (NO. & % OF TOTAL)	
12.1 USN	U
12.2 USNR	U
12.3 USCG	U
12.4 MARINES	U
12.5 OTHER	U
12.6 STANDBY STUDENTS (INCLUDED IN USN)	NA
13. TOTAL STUDENTS TRAINED	U
14. COURSE UTILIZATION (WITH STANDBYS)	U
15. COURSE UTILIZATION (WITHOUT STANDBYS)	NA
16. TOTAL UNREPORTED TRAINING	U

TABLE [illegible]
[illegible]
(DECEMBER JANUARY 1979 to 1 [illegible] 1979)

	DATA	COURSE REGULATIONS				
		[illegible] NORFOLK	[illegible] MAYPORT	[illegible] SAN DIEGO	[illegible] CHARLESTON	NAS TREASURE ISLAND
[illegible]	[illegible]	0	5	6	5	8
[illegible]	[illegible]	30	24	46	15	25
[illegible]	[illegible]	24	25	26	2	0
[illegible]	MAXIMUM QUOTA AVAILABLE	540	600	1170	30	175
	[illegible]	840	9	1137	48	210
	[illegible]	574	553	797	44	164
7.	[illegible] SEATS REQUESTED	100	8	97	160	120
8.	[illegible]	68	60	63	147	94
[illegible]	[illegible]	68	8	70	92	78
	[illegible]	266	7	494	4	46
[illegible]	[illegible]	32	1	43	8	22
12.	[illegible]					
[illegible]	[illegible]	[illegible]	[illegible]	776(97)	44[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]			1<1	[illegible]	[illegible]
		[illegible]			[illegible]	[illegible]
	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]
		[illegible]	[illegible]	[illegible]	48	[illegible]
	[illegible]	71	[illegible]	66	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]					

TABLE B-12. COURSE J-495-2129,
FIRE FIGHTING - RECRUIT TRAINING
(PERIOD 1 JANUARY 1979 to 1 JULY 1979)

COURSE DATA	COURSE LOCATIONS			
	NTC ORLANDO	NTC[1] GREAT LAKES	FTC SAN DIEGO	NTTC[2] TREASURE ISLAND
MAXIMUM QUOTA	160	160	160	U
MAXIMUM NUMBER COURSES	132	66	132	U
MAXIMUM QUOTAS AVAILABLE	21,120	10,560	21,120	U
QUOTAS FILLED	21,120	10,560	21,120	U
UNREPORTED TRAINING	0	0	0	790

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